

An aerial photograph of a desert landscape, likely in the southwestern United States. The terrain is arid and rocky, with several winding roads or paths visible. There are some small, light-colored structures or buildings scattered across the landscape, particularly in the lower right quadrant. The overall tone is black and white, giving it a historical or official appearance.

Ute Indian Tribe Environmental Program: Oil & Gas Training – Air

Cindy Beeler
US EPA – Region 8
Mar. 12, 2014

Outline

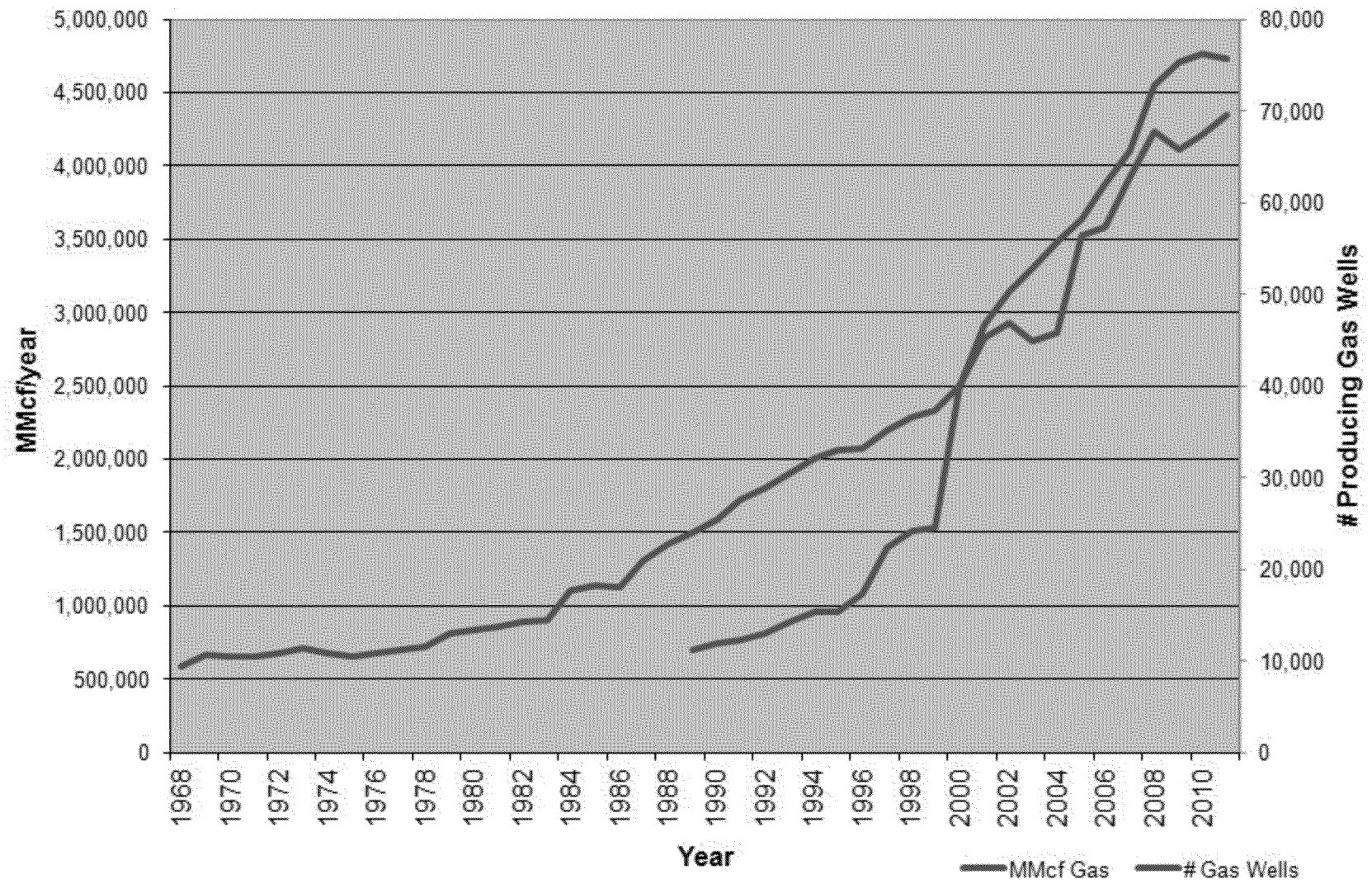
- Air emissions from O&G
- EPA R8 CAA settlements in Indian country
- Air Regulations
- Inspections
- EPA Natural Gas STAR program
- GHG Reporting Rule – Subpart W
- Information Sources

House Rules

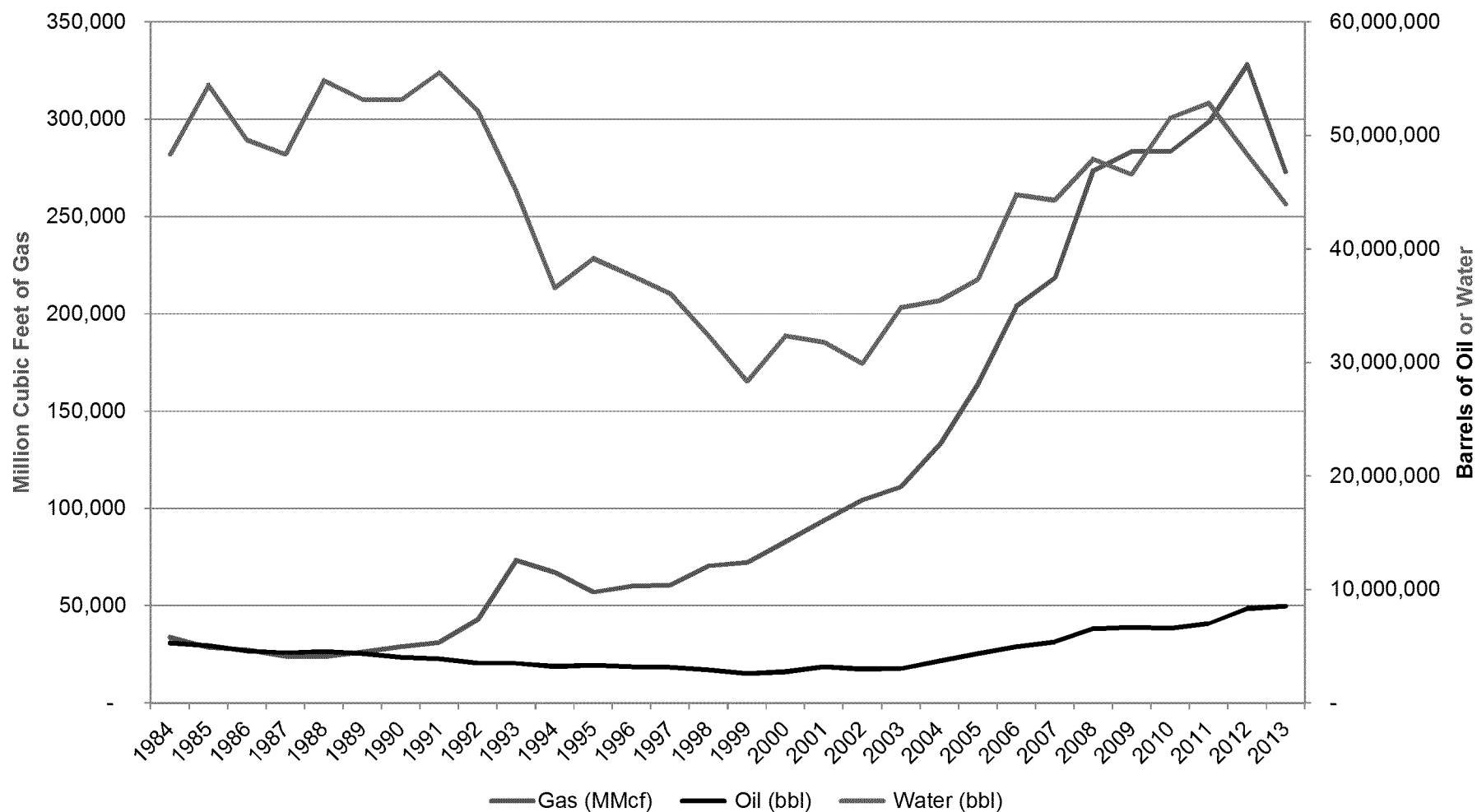
- Easy ... Informality rules!
- Got a question ... ask
- Know the answer ... tell

AIR EMISSIONS

R8 Annual Natural Gas Gross Withdrawals



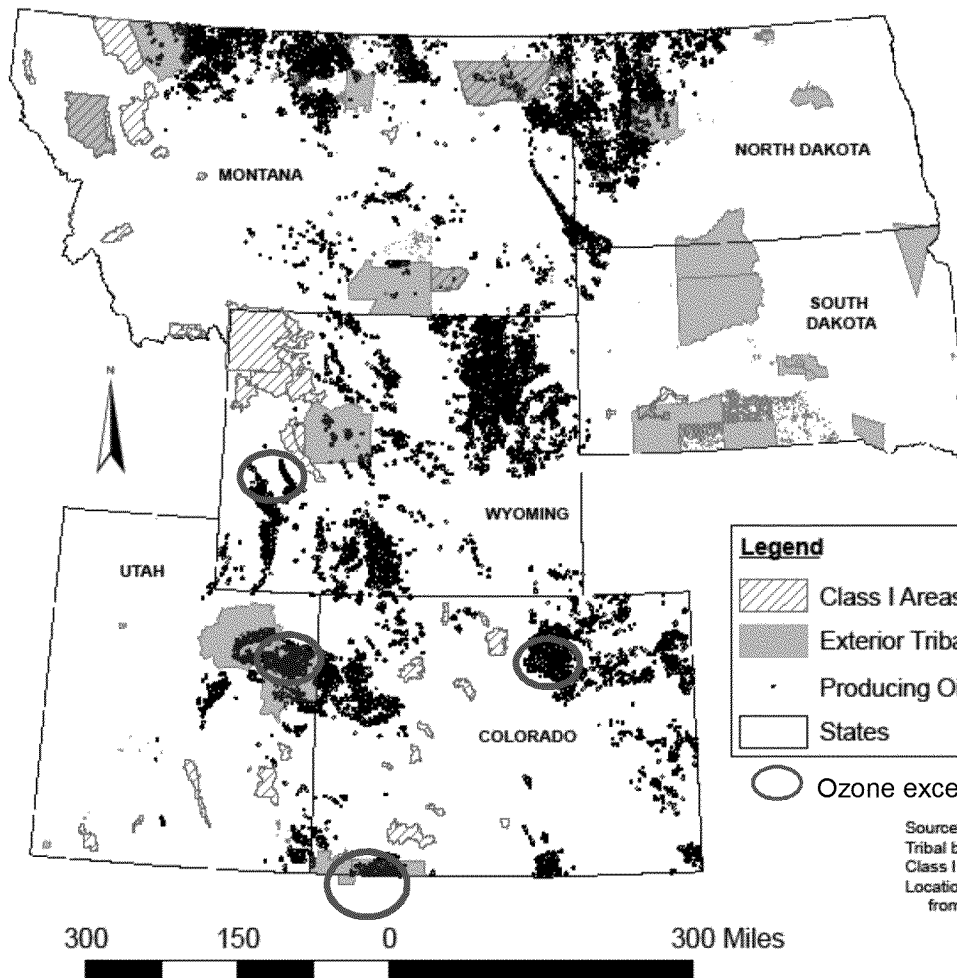
UINTAH County Oil/Gas/Water Production



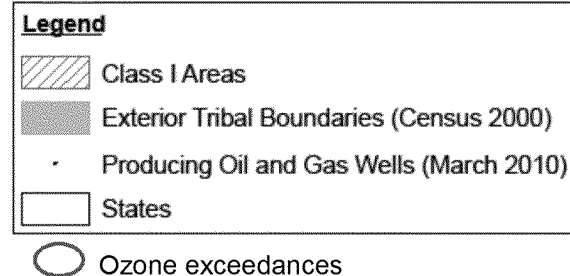
OIL & GAS PRODUCTION IN REGION 8

State	Producing Oil & Gas Wells
CO	36,925
MT	14,528
ND	4,228
SD	231
UT	8,941
WY	39,961

Disclaimer:
EPA makes no claims regarding the accuracy or precision of this data. Questions concerning the data should be referred to the source agency. The Reservation boundaries shown here are suitable only for general spatial reference and do not necessarily represent EPA's position on any Indian country boundaries or the jurisdictional status of any specific location. EPA programs should consult the Office of Regional Counsel for legal advice before making decisions regarding jurisdiction on or near any Reservation.



April 6, 2010



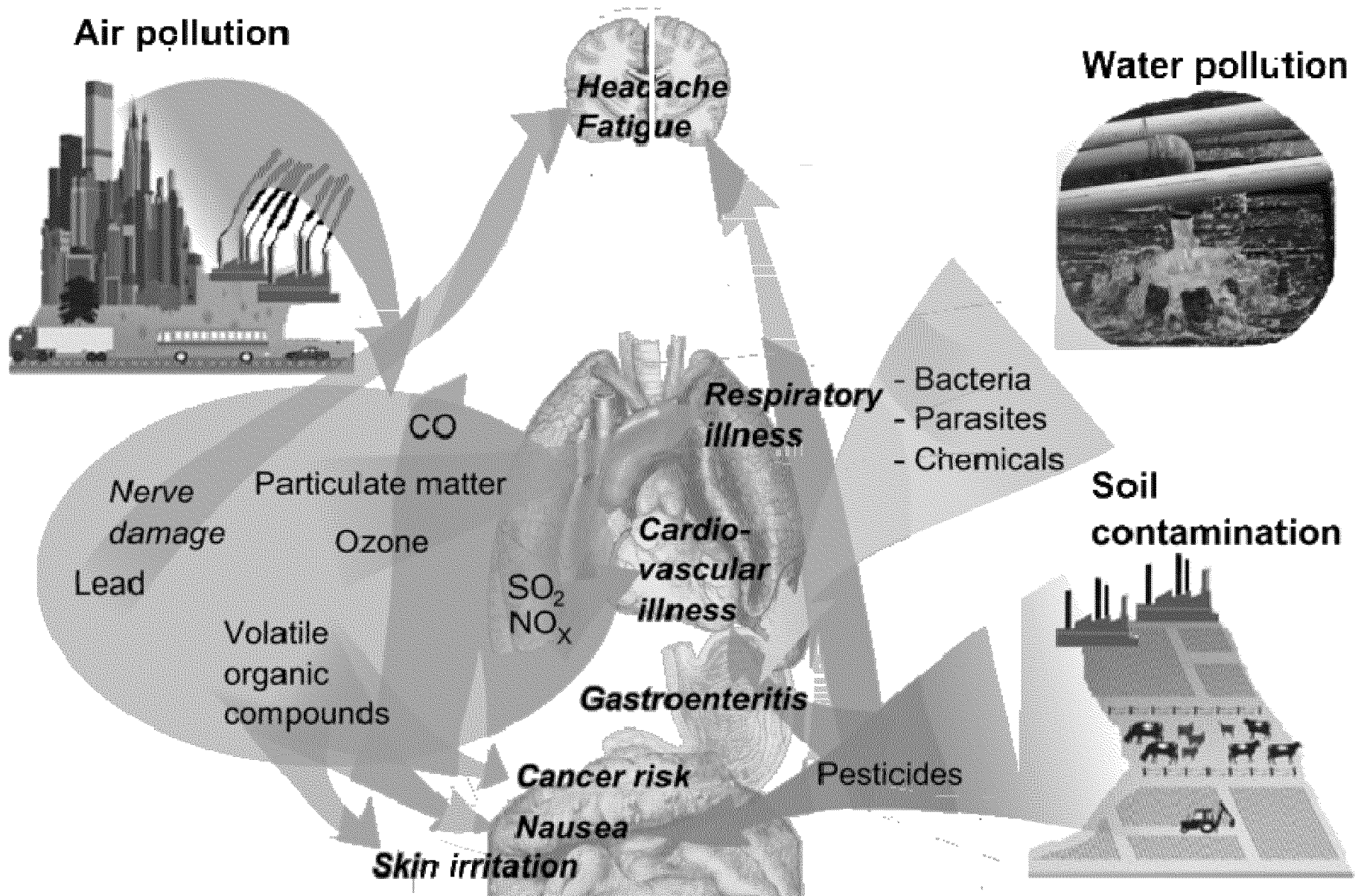
Sources:
Tribal boundaries are Census 2000 data.
Class I areas compiled by Region 8 GIS staff.
Locations of producing oil and gas wells are from state oil and gas commissions.

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Environmental Air Impact From O&G Activities

- Ozone (current 75 ppb standard – likely to lower)
- Regional haze – impacting visibility in Class I areas
- Nitrogen deposition – Class I areas
- Air Toxics – aka HAPs Hazardous Air Pollutants
- Greenhouse Gas (GHG) emissions

Health effects of pollution



Ozone

Good Up High
Bad Nearby

NO_x + VOC + sunlight + snow cover → ground-level ozone

Health problems from breathing ozone

- Chest pain, shortness of breath
- Coughing & sore, scratchy throat
- Inflammation & damage the airways
- Worsen asthma, bronchitis, emphysema
- Increase the frequency of asthma attacks
- Reduce lung function and inflame the linings of the lungs
- Repeated exposure may permanently scar lung tissue



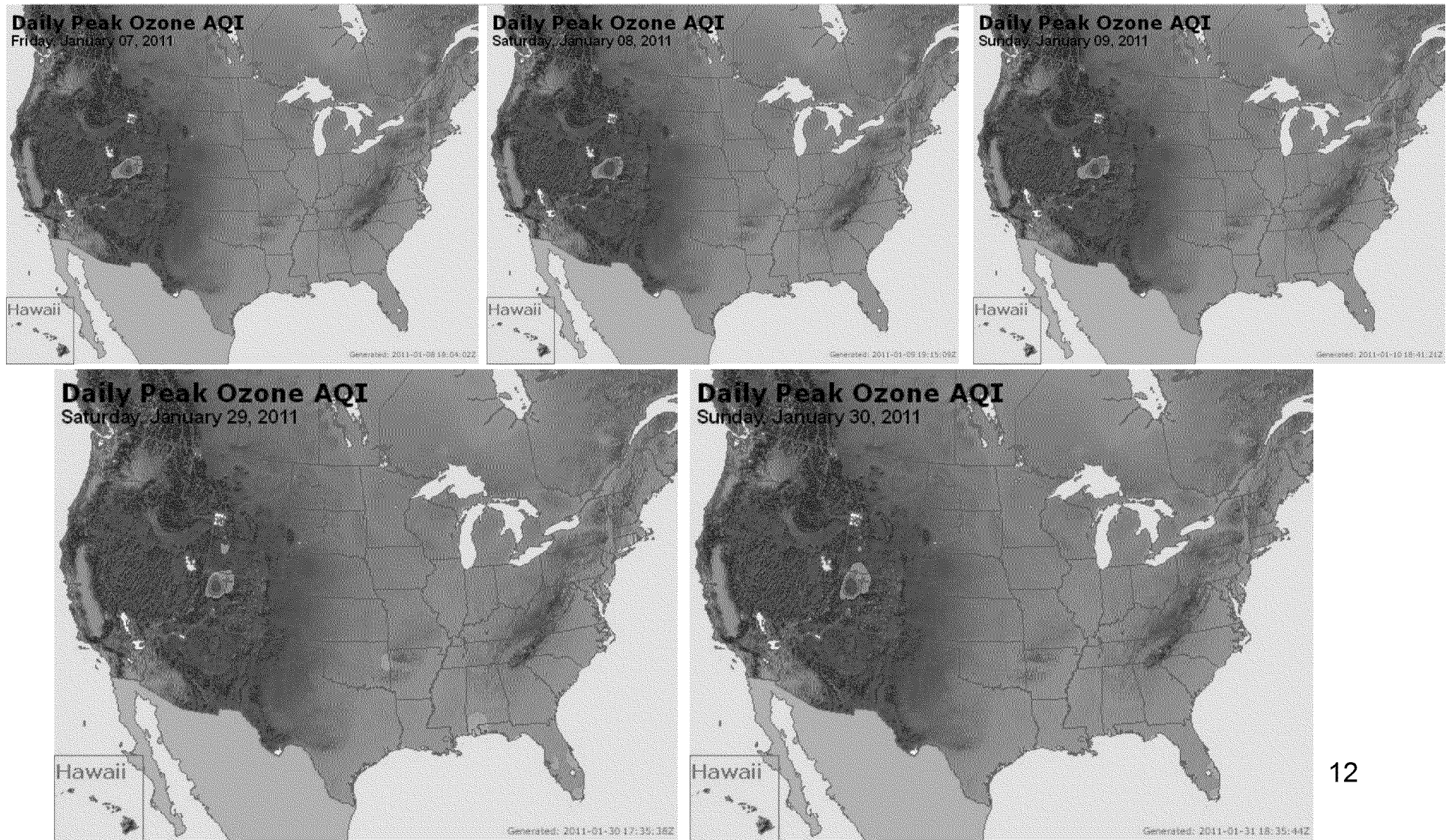
2013 Region 8 Ozone Calendar: All Red and Purple Days in Uinta Basin

Day of Mo	January	February	March	April	May	June	July	August	September	October	November	December
1	66	86	124	61	67	71	71	66	60	55	46	51
2	70	95	134	60	62	72	73	69	73	56	55	50
3	71	102	141	58	61	63	N Provo 85	65	64	49	52	52
4	67	95	91	54	63	62	73	69	66	49	51	53
5	67	115	66	55	GBNP 76	75	68	70	68	54	47	55
6	72	137	96	56	68	71	70	67	71	48	49	49
7	81	98	132	57	68	69	72	66	Rocky F 78	56	46	47
8	90	98	90	62	64	68	75	62	Chat. 81	57	50	47
9	100	80	59	66	59	R Flats 81	Hawth. 81	60	62	58	53	48
10	103	59	64	Cent. 77	63	67	Harris. 88	62	55	67	47	50
11	90	66	65	59	62	67	NREL 86	62	58	50	49	59
12	44	79	65	58	66	RMNP 82	Sioux Fls 79	66	55	49	51	67
13	46	91	59	61	66	Chat 80	73	64	50	55	48	65
14	47	125	61	60	67	66	67	62	50	53	48	84
15	55	114	58	58	70	72	Hawth. 84	74	57	50	52	94
16	69	114	57	61	65	67	Rocky F 80	NREL 79	58	45	54	95
17	82	127	60	62	68	Beach 77	Rocky F 93	FCW 87	59	47	51	101
18	95	77	58	59	Lostw. 76	Brig. City 78	Chat 83	66	57	50	51	102
19	96	98	56	63	61	71	N Provo 79	74	58	47	51	90
20	108	107	53	56	70	74	N Provo 77	Rocky Fl 76	61	47	44	69
21	129	124	60	58	74	71	Chat 83	NREL 76	65	48	51	57
22	121	72	59	59	67	72	NREL 79	70	59	54	51	66
23	113	57	59	61	75	67	N Provo 77	70	56	54	23	72
24	124	59	60	61	GBNP 76	66	71	69	58	54	49	85
25	124	68	61	63	72	60	70	67	60	54	44	69
26	126	84	59	63	67	69	68	60	68	51	47	65
27	107	73	60	66	66	Ogden 77	65	63	58	51	45	70
28	50	90	61	68	68	Chat 85	56	Chat 76	49	48	44	78
29	47		61	59	68	68	56	Chat 86	49	49	43	79
30	64		69	67	74	70	65	72	50	48	42	80
31	68		59		79 USAF		71	61		53		85
Exceedance Days/mo	16	21	7	0	0	0	0	0	0	0	0	11

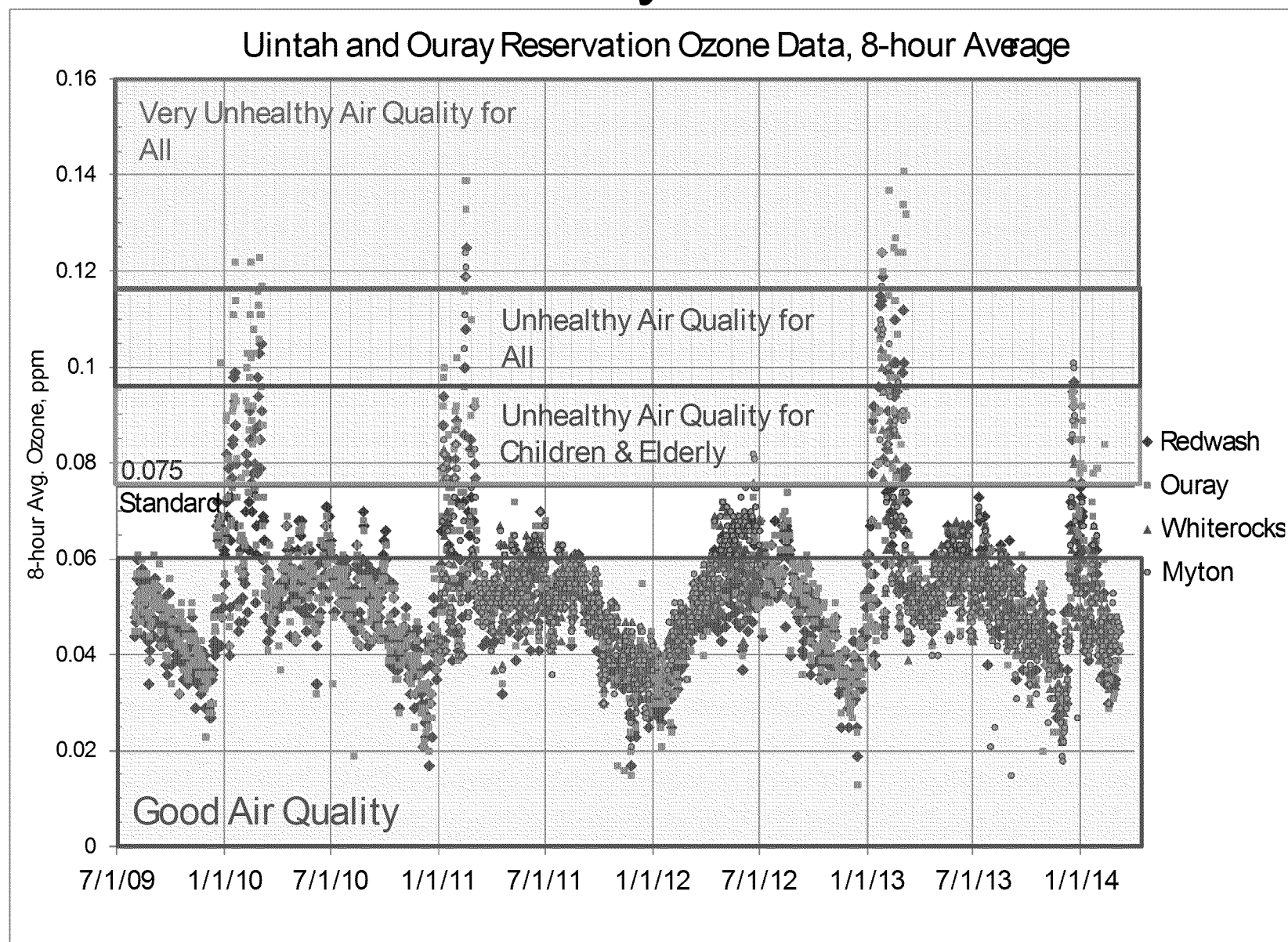
	Good
	Moderate
	Unhealthy for sensitive groups
	Unhealthy
	Very Unhealthy

Peak 2011 National Air Quality Maps

Uinta Basin High Days



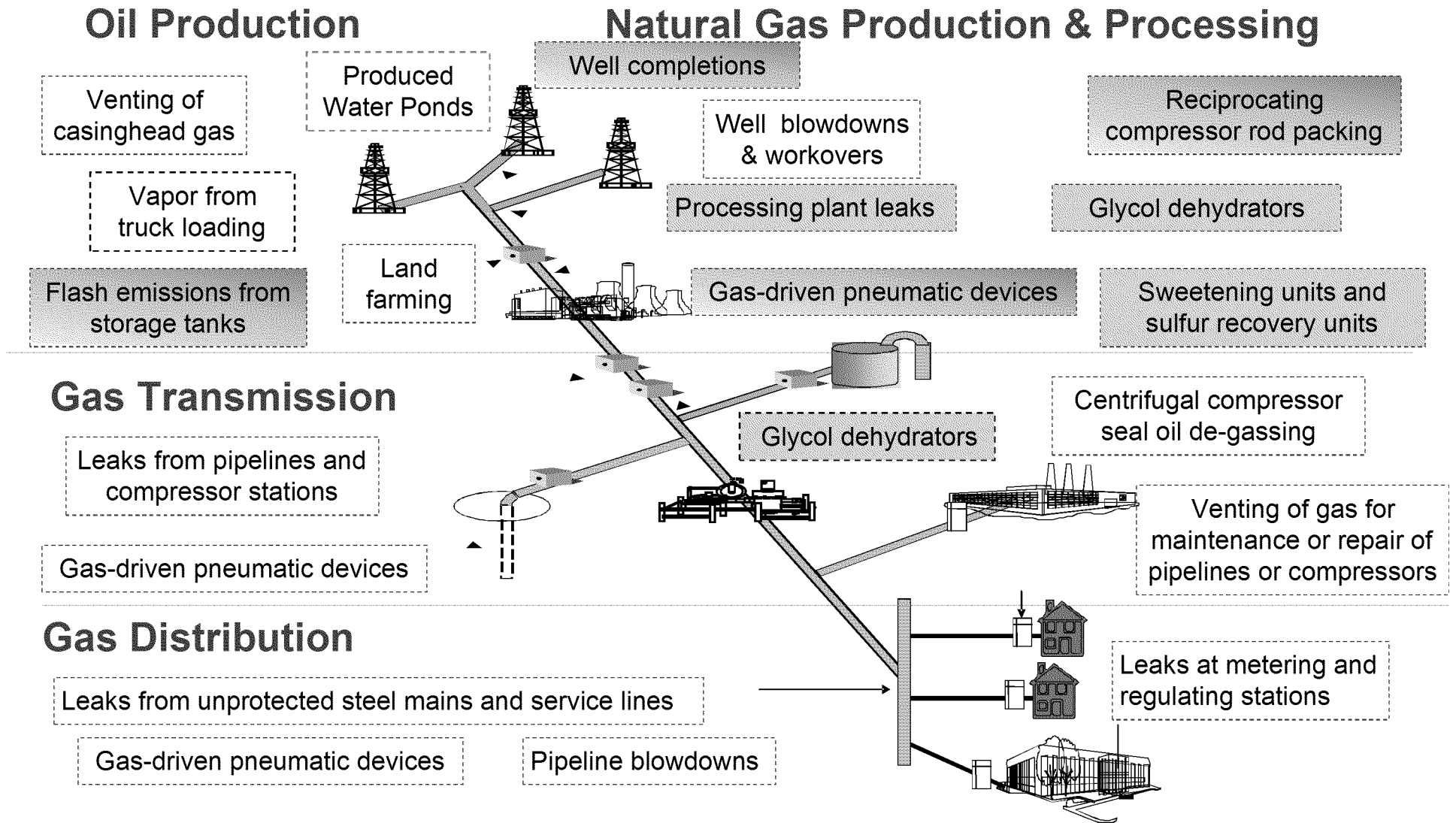
8-hour Average Ozone Data from the Uintah & Ouray Reservation



Monitor Locations



Where are the emissions?



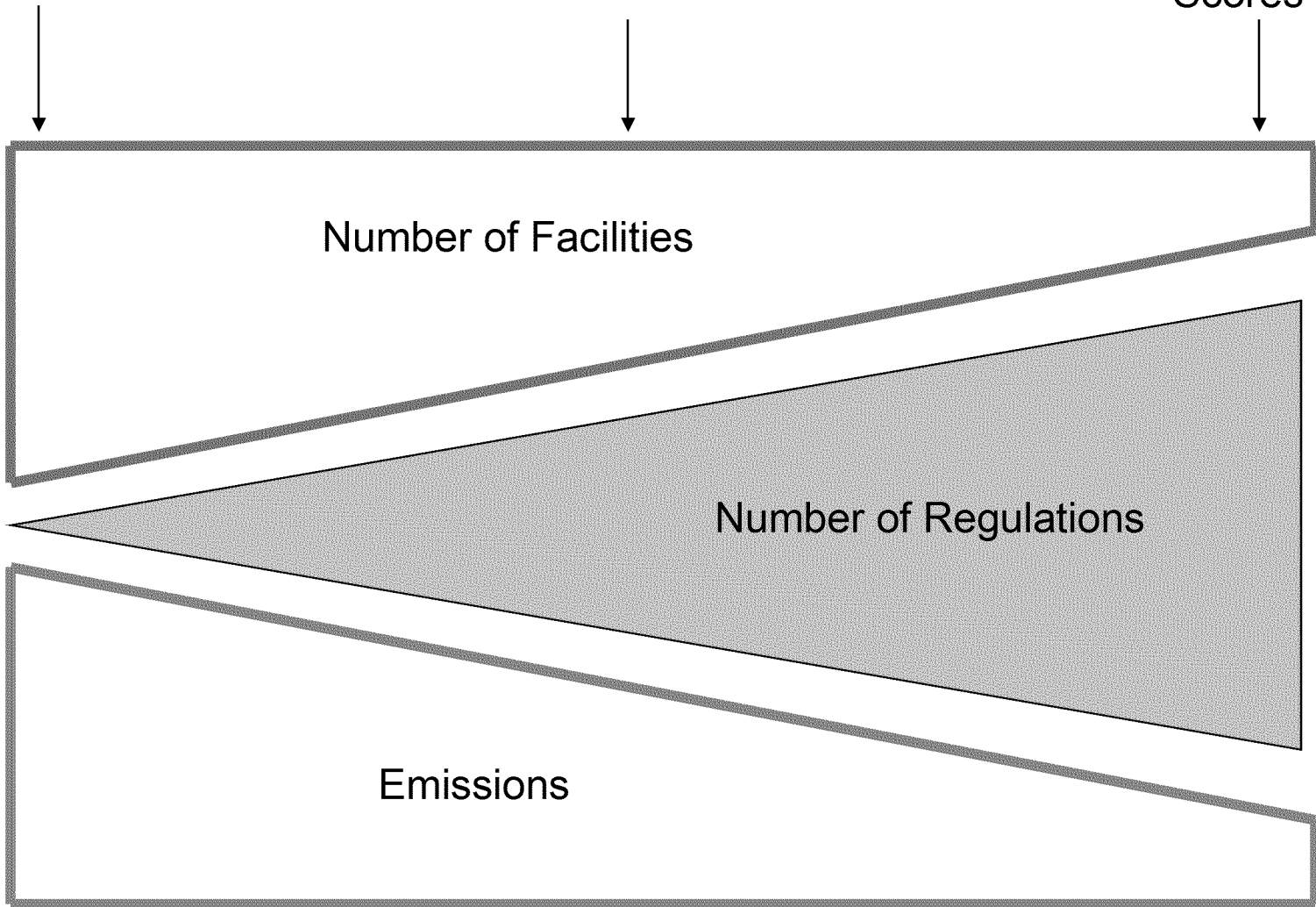
Slide courtesy of American Gas Association and Office of Atmospheric Programs

NOTE: Shaded boxes denote emission sources at least partially covered by existing rules

Well sites
100,000's

Compressor Stations
1,000's

Gas Plants
Scores



GHG Reporting and WRAP Emission Inventories by these Basins



Uinta Basin

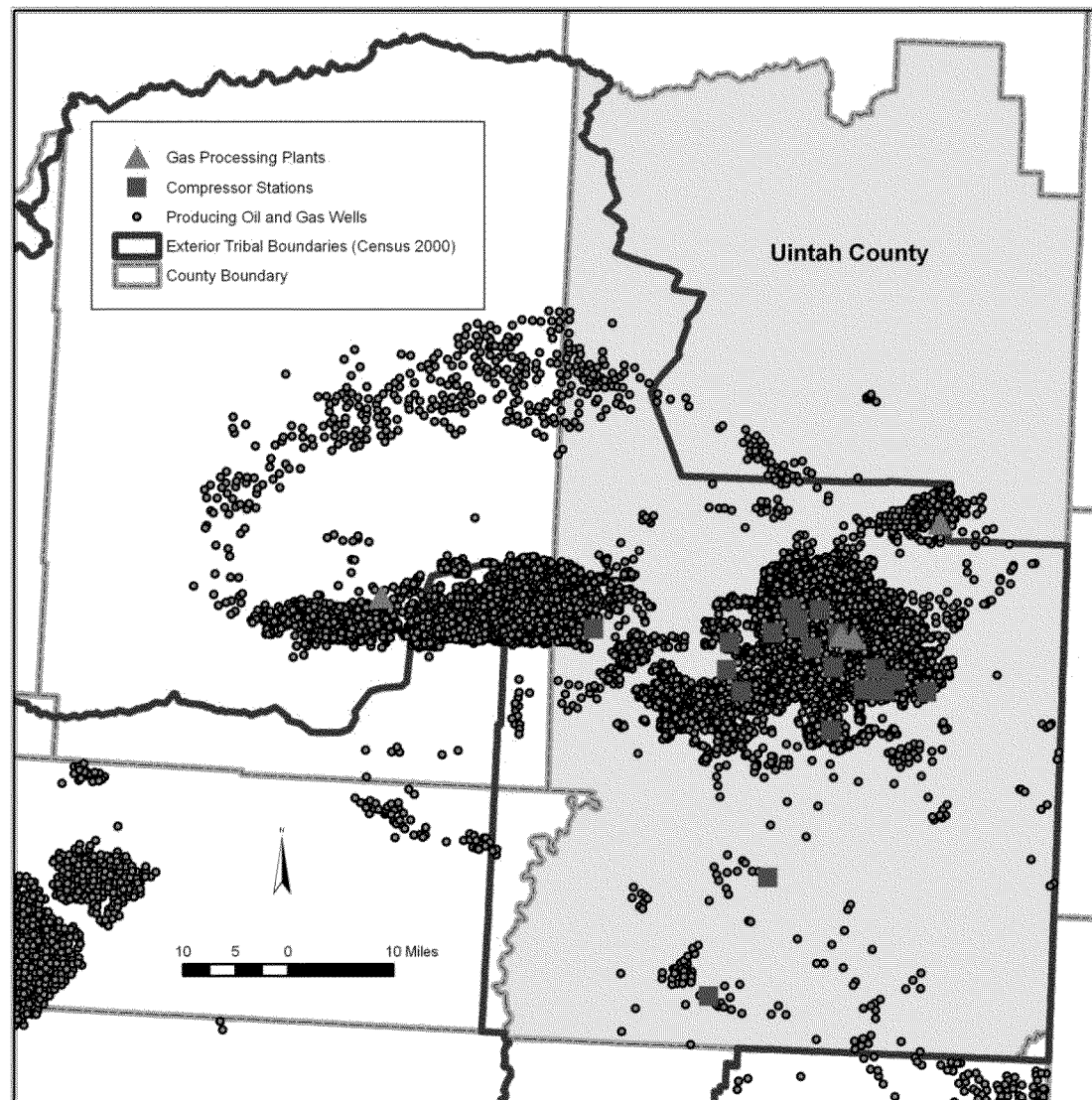


Legend

 Uinta Basin



0 15 30 60 90 120 Kilometers



Uintah County Data

4,227 Gas Wells

790 Oil Wells

283 Gas Production (billion cubic feet)

6.7 Oil Production (million barrels)

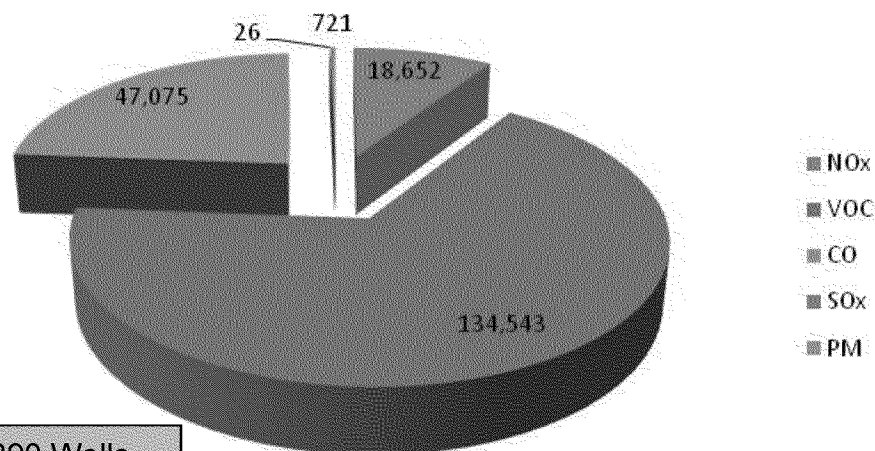
62 Compressor Stations

4 Gas Plants

Emission Differences by Basin

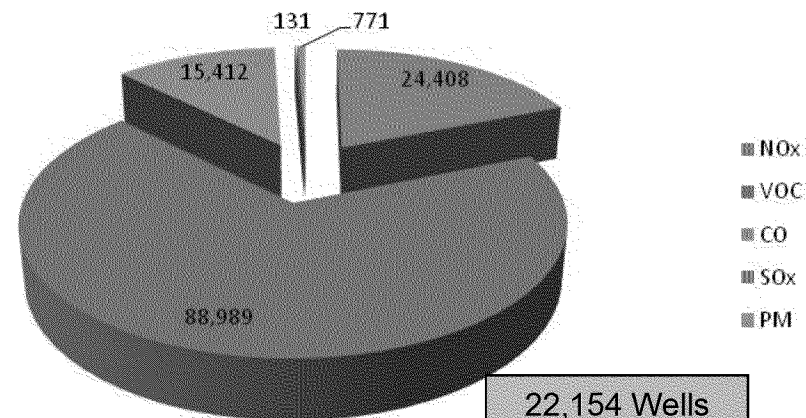
(WRAP Phase III)

Uinta Basin - Emissions (TPY)



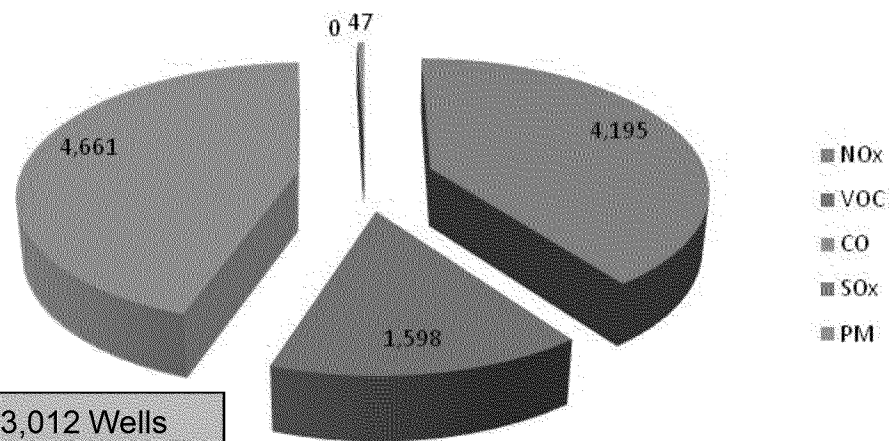
10,890 Wells
15% Gas = CBM

D-J Basin - Emissions (TPY)



22,154 Wells
0% Gas = CBM

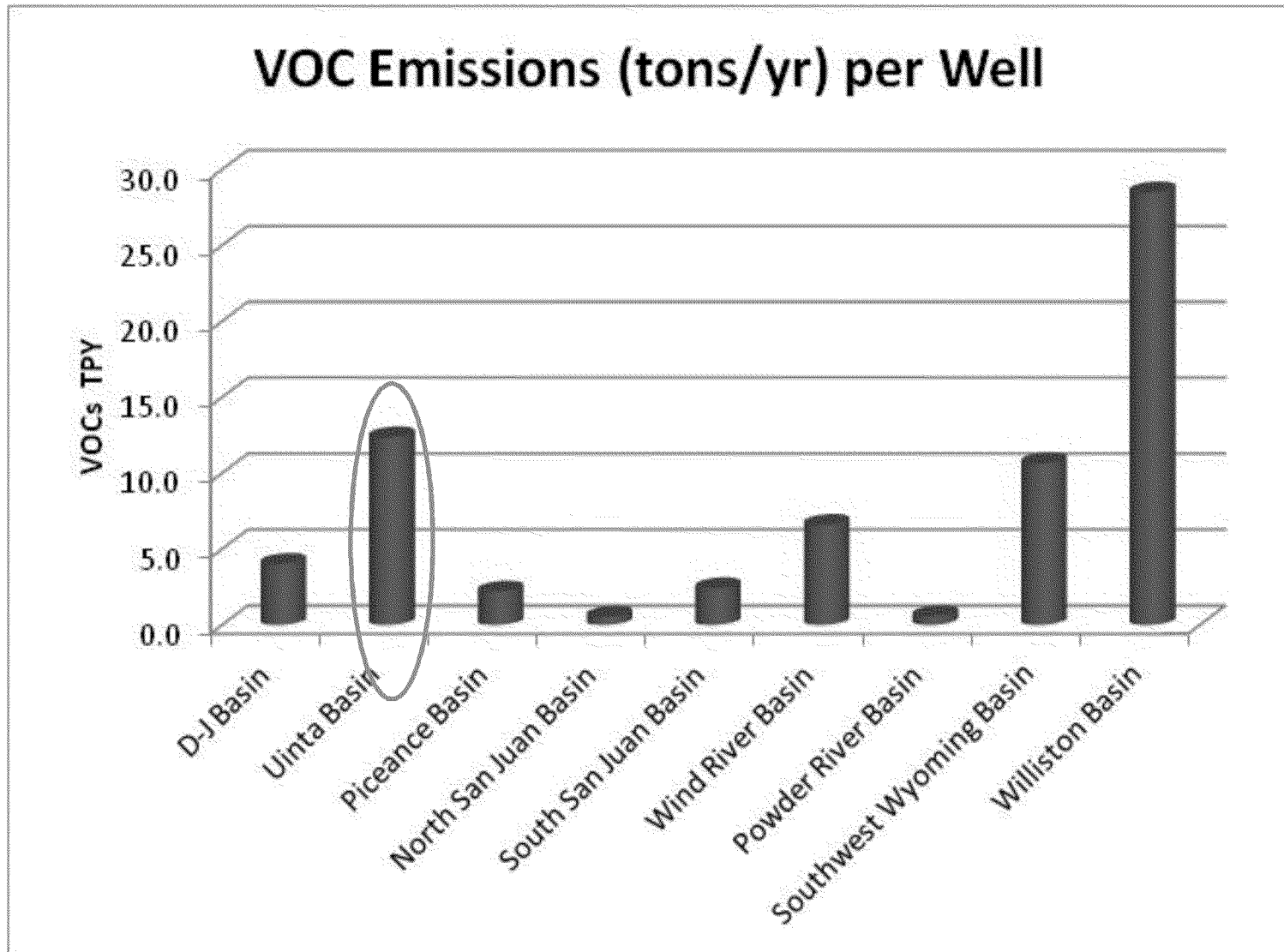
North San Juan Basin - Emissions (TPY)



3,012 Wells
93% Gas = CBM

Emission Differences by Basin

(WRAP Phase III)



WRAP (Western Regional Air Partnership) Phase III 2006 Activity and Emission Estimates by Basin

Basin	Emissions (tons/yr)				
	NOx	VOC	CO	SOx	PM
D-J Basin	24,408	88,989	15,412	131	771
→ Uinta Basin	18,652	134,543	47,075	26	721
Piceance Basin	9,951	20,962	7,668	77	374
North San Juan Basin	4,195	1,598	4,661	0	47
South San Juan Basin	43,050	55,705	25,421	132	523
Wind River Basin	1,758	12,480	2,738	1,618	39
Powder River Basin	23,149	17,779	21,630	558	686
Southwest Wyoming Basin	21,136	105,498	13,158	5,486	611
Williston Basin	46,114	454,443	76,480	7,046	2,596

NOx + VOC + sunlight ground-level ozone

Where there are VOC emissions, there are methane emissions

<http://www.wrapair2.org/PhaseIII.aspx>

WRAP Phase III Emission Inventory – Uinta Basin

Description	2012 Emissions				
	NOx (tons/year)	VOC (tons/year)	CO (tons/year)	SOx (tons/year)	PM10 (tons/year)
Dehydrator	225	30,665	189	0	17
Pneumatic devices	0	25,083	0	0	0
Condensate tank	0	21,719	0	0	0
Oil Tank	0	20,722	0	0	0
Pneumatic pumps	0	14,322	0	0	0
Permitted Sources	3,184	4,355	2,517	8	48
Unpermitted Fugitives	0	3,212	0	0	0
Truck Loading of Oil	0	1,391	0	0	0
Venting - Compressor Startup	0	1,300	0	0	0
Venting - Compressor Shutdown	0	1,233	0	0	0
Artificial Lift	3,053	955	34,750	2	136
Compressor engines	3,169	695	4,236	0	46
Venting - blowdowns	0	460	0	0	0
Truck Loading of Condensate	0	445	0	0	0
Drill rigs	4,773	362	1,507	3	236
Venting - initial completions	0	332	0	0	0
Heaters	1,671	95	1,420	11	132
Miscellaneous engines	199	63	201	0	1
Venting - recompletions	0	51	0	0	0
Workover rigs	271	22	91	0	15
Gas Plant Truck Loading	0	12	0	0	0
Condensate tank flaring	2	0	9	0	0
Dehydrator Flaring	0	0	1	0	0
Initial completion Flaring	1	0	4	0	0
Total	16,547	127,495	44,925	24	631

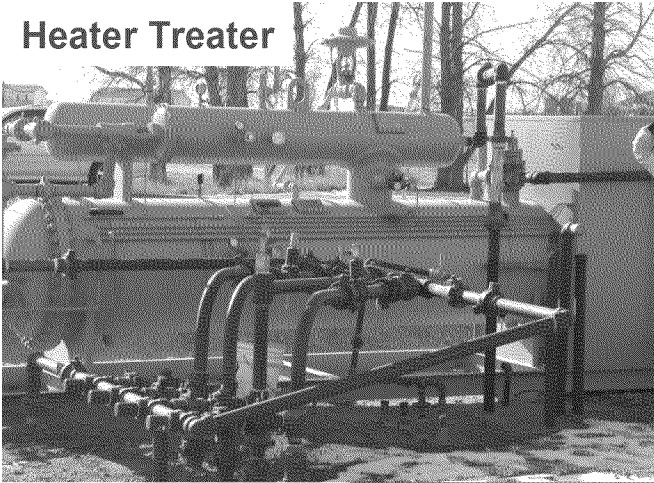
Wellfield



Wellsite Facility

State Regs

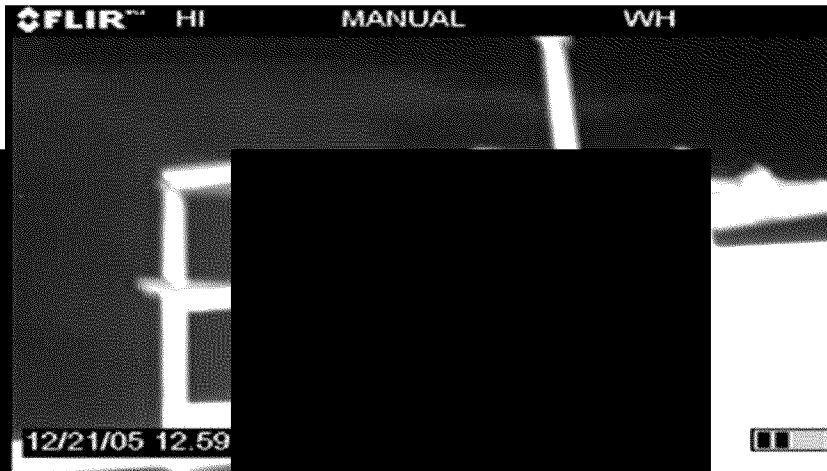
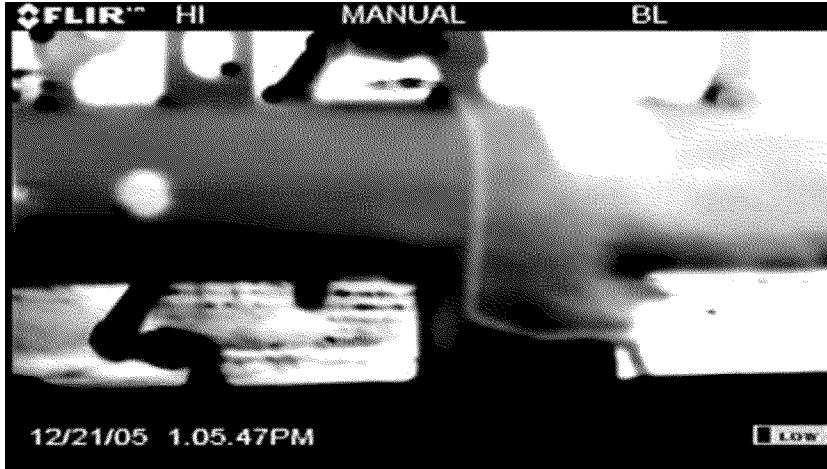
Heater Treater



Condensate Tank

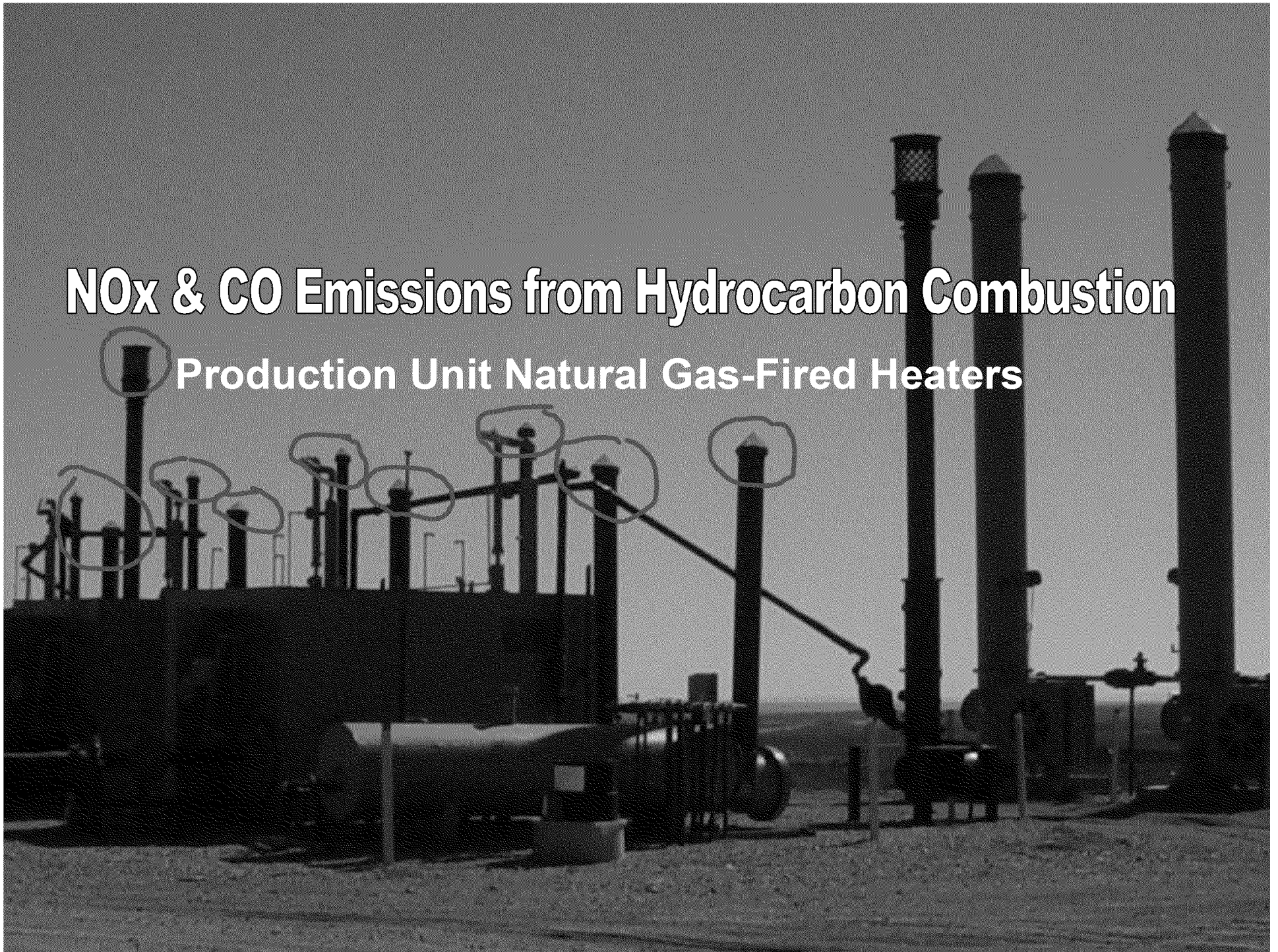


Water Tank



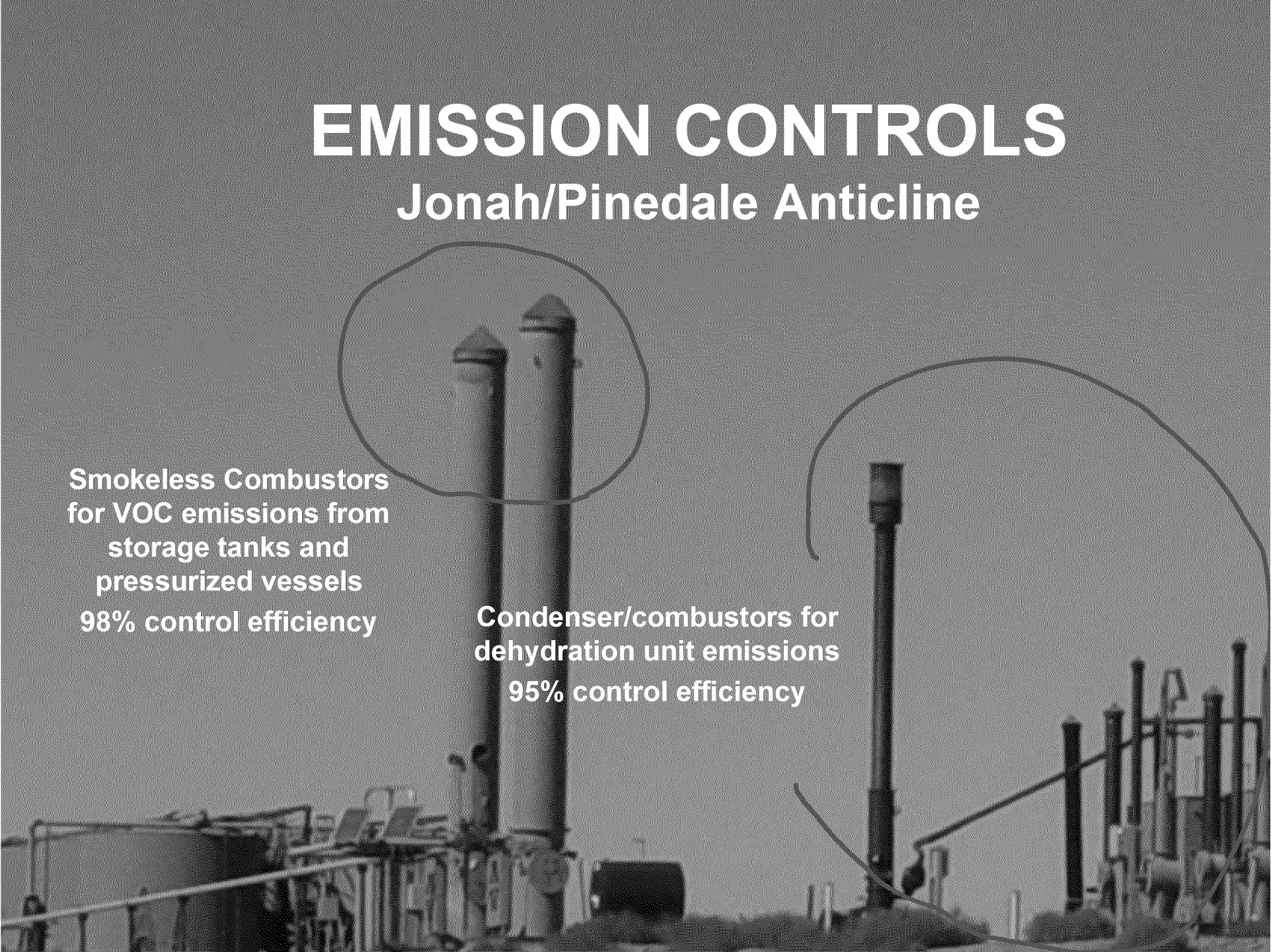
NO_x & CO Emissions from Hydrocarbon Combustion

Production Unit Natural Gas-Fired Heaters



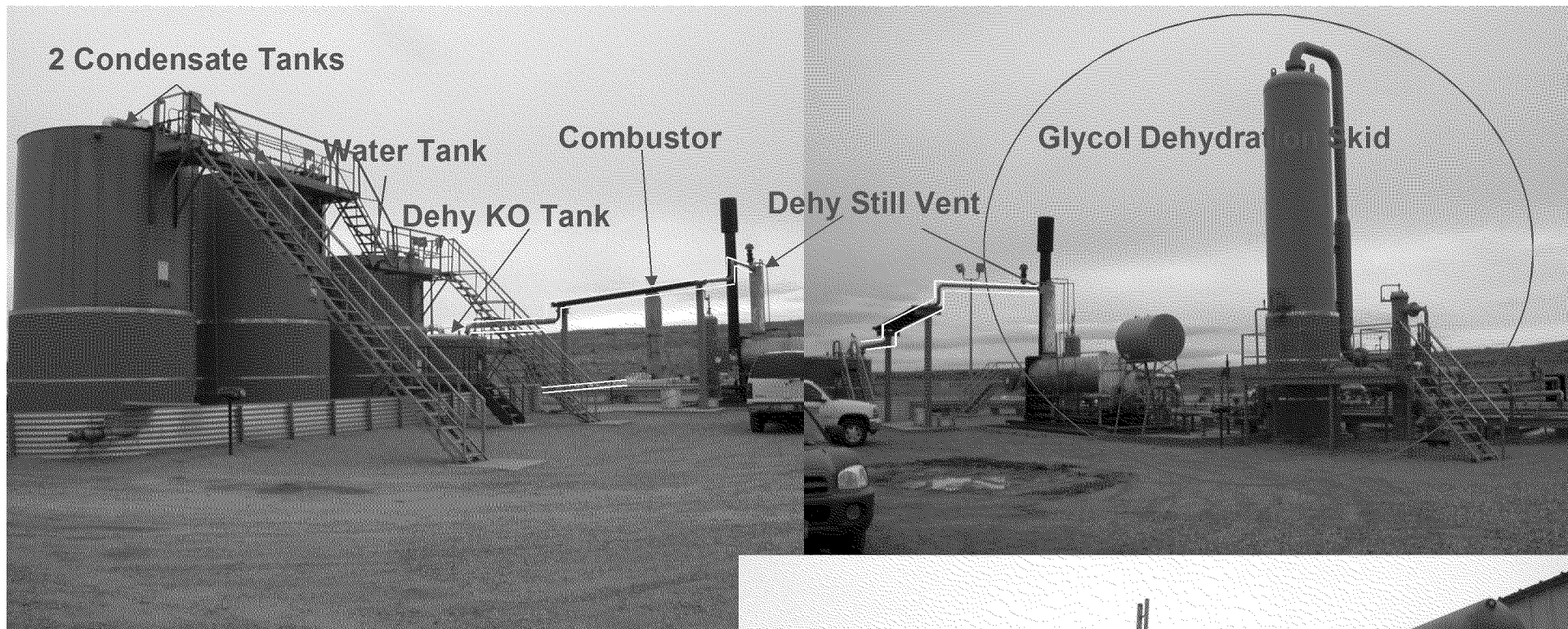
EMISSION CONTROLS

Jonah/Pinedale Anticline



Smokeless Combustors
for VOC emissions from
storage tanks and
pressurized vessels
98% control efficiency

Condenser/combustors for
dehydration unit emissions
95% control efficiency



Compressor Station

MACT HH ... glycol dehydrators

MACT ZZZZ ... engines (RICE)

NSPS JJJJ ... engines

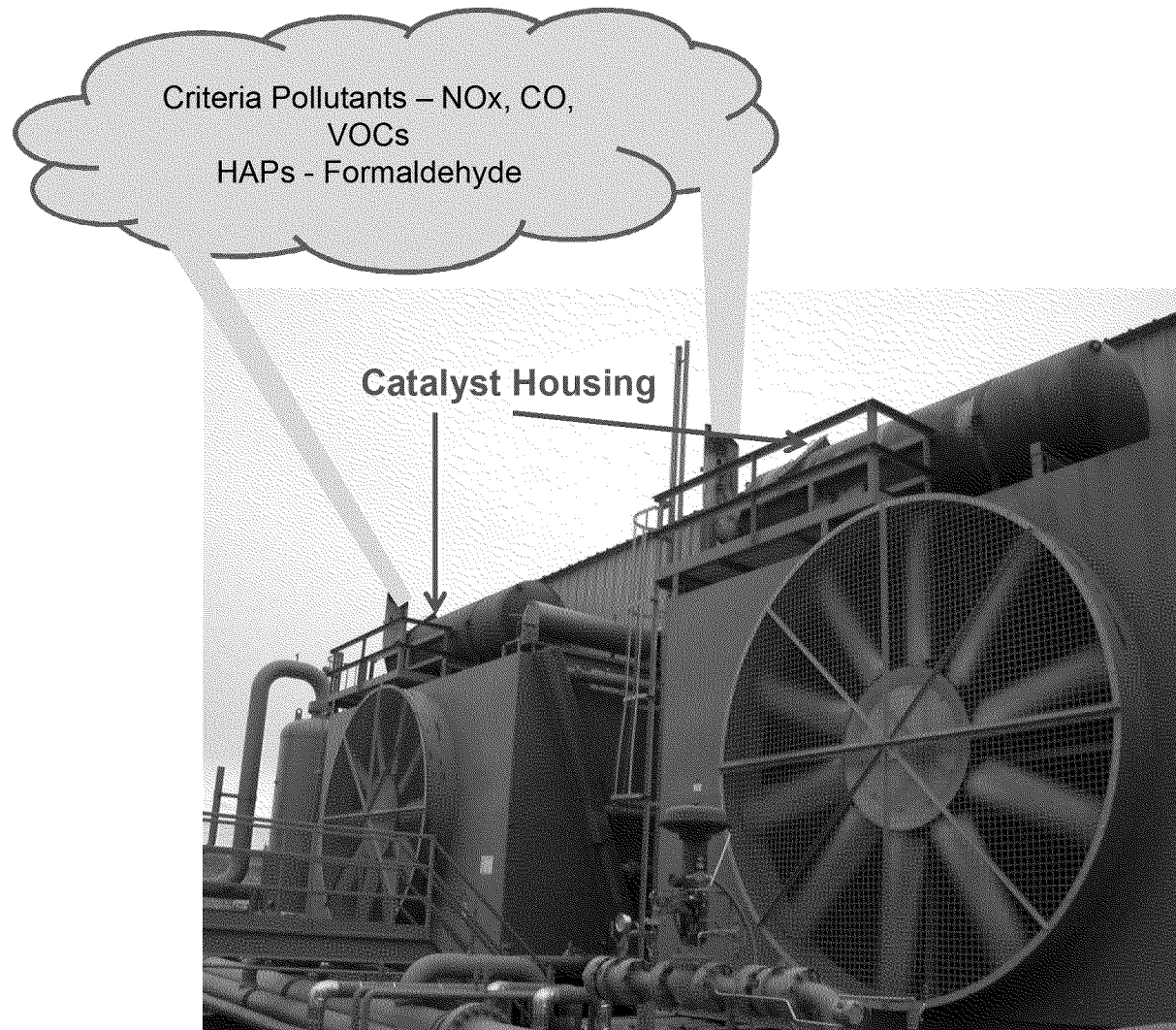
NSPS OOOO ... compressors

Title V

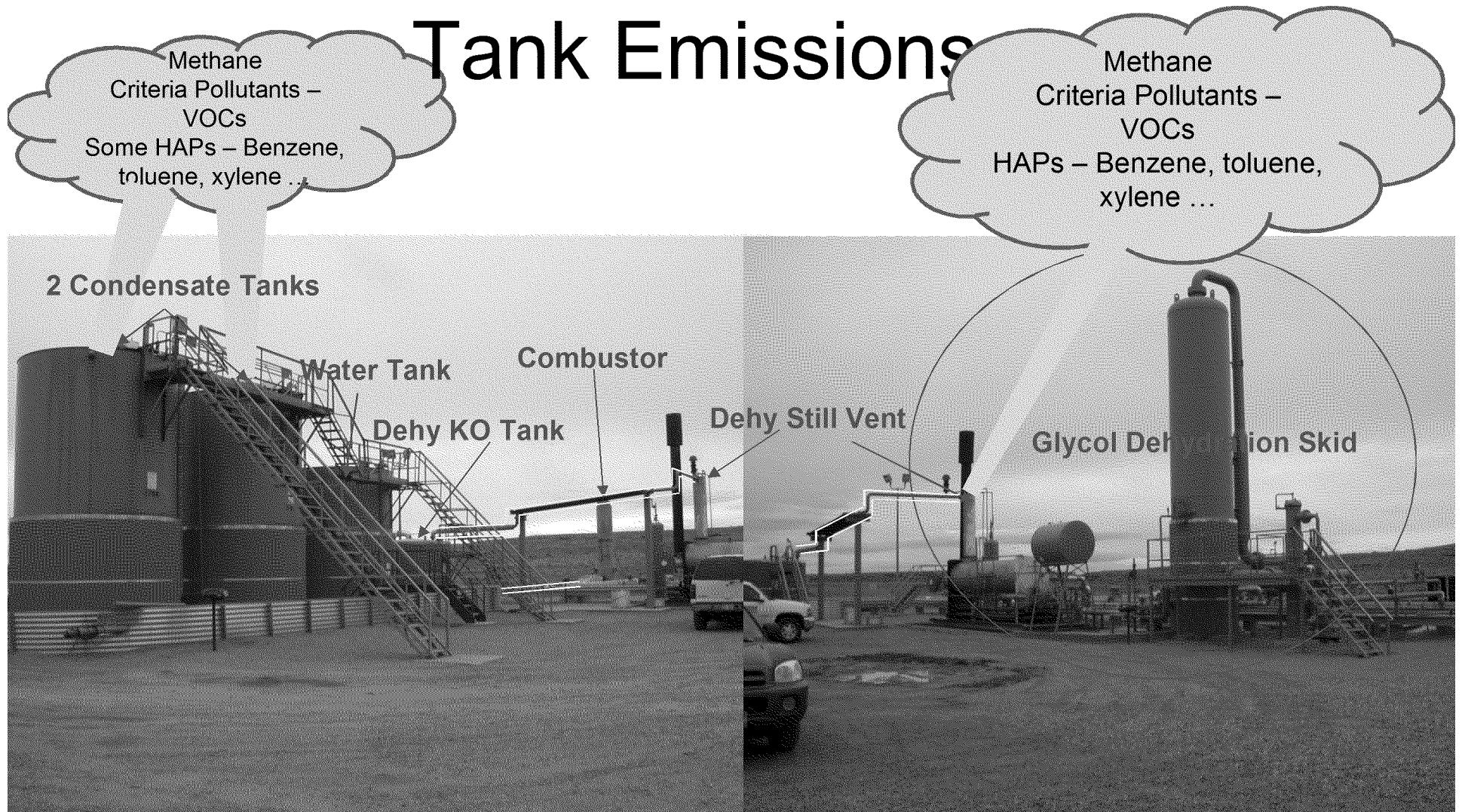
PSD



Compressor Skid – Engine Emissions



Glycol Dehydrator and Condensate Tank Emissions

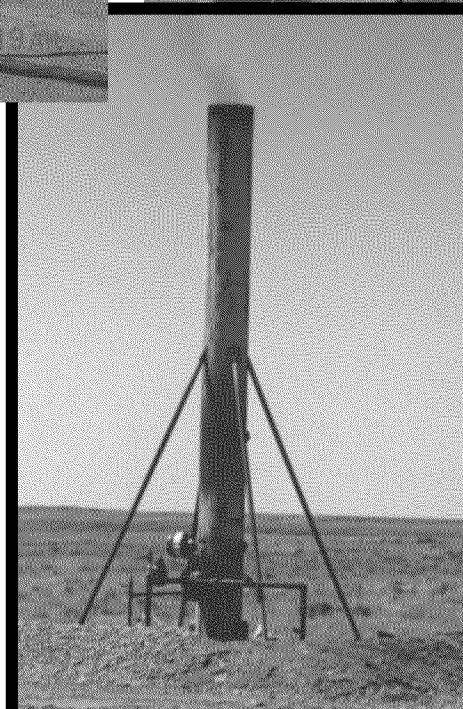
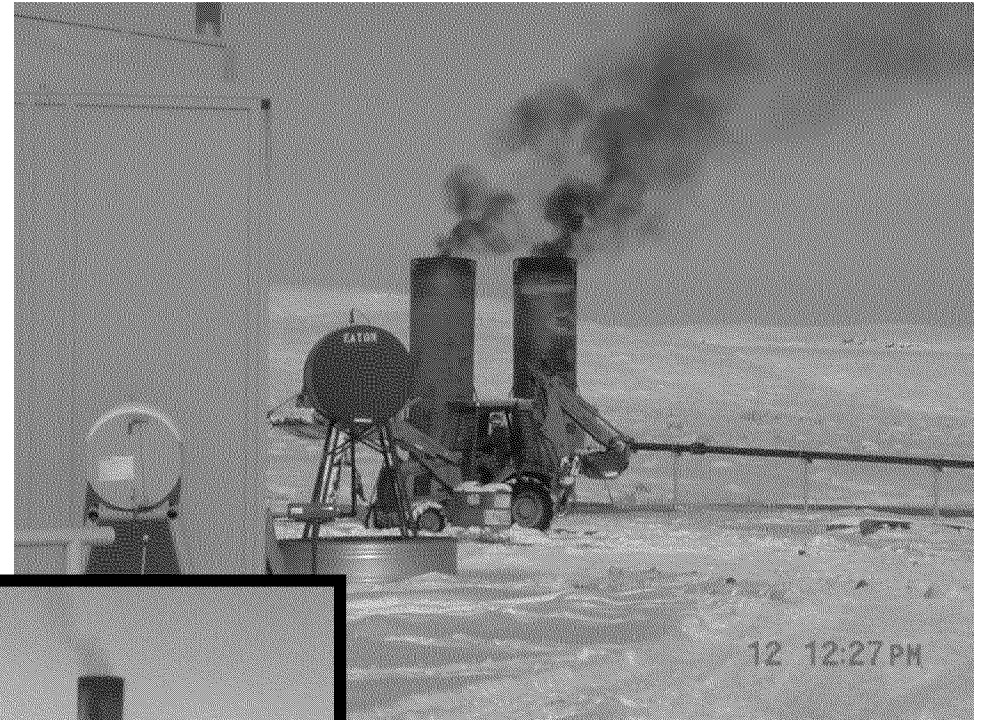
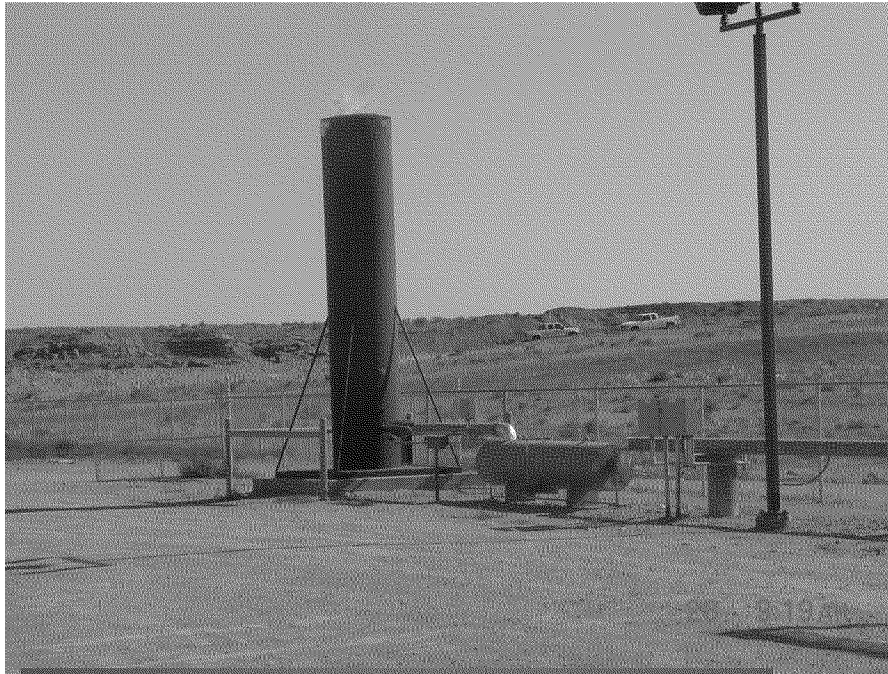


Emissions from glycol dehydrators and from condensate storage tanks are carried through a “Closed Vent System” to the control device (combustor) and is shown above outlined in yellow.

Leaking Closed Vent System (MACT HH)



Enclosed Flare aka Combustor





MANUAL

WH

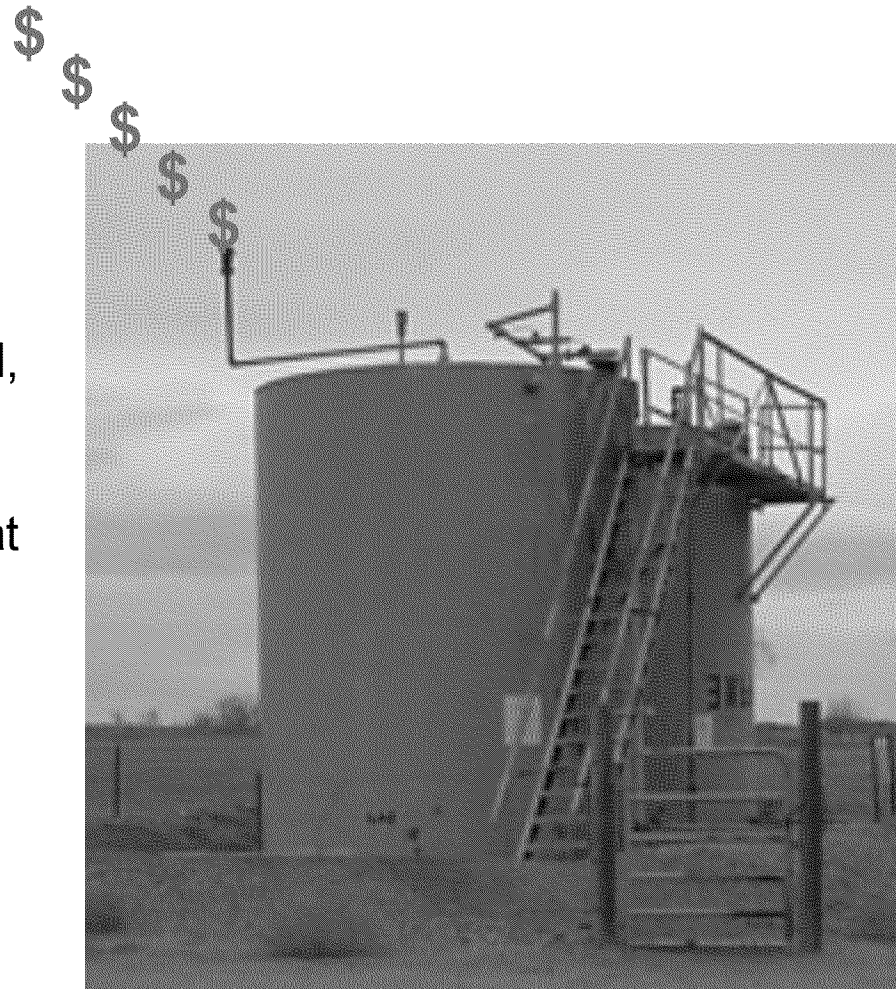
10/14/08 9.05.32PM



Why Let \$ Escape Into the Air?

Besides being an environmental hazard, escaping vapors actually cost the operator money. What money?

Uncaptured profits!



Gas Plant

MACT HH
MACT ZZZZ
NSPS JJJJ/GG/KKKK
NSPS OOOO
NSPS KKK
NSPS LLL
Title V
PSD

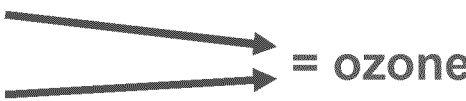


EPA Region 8 O&G CAA Settlements

EPA Region 8 O&G CAA Enforcement Activities in Indian country

- 18 cases settled so far:
 - 11 on Uintah & Ouray Reservation
 - 7 on Southern Ute Reservation
- Other settlements underway – Southern Ute, Uintah & Ouray, and Ft. Berthold

Region 8 O&G Settlements

- Emission reductions achieved:
 - ~2,000 TPY CO
 - ~2,800 TPY NO_x
 - ~4,100 TPY VOC
 - ~800 TPY HAPs

= ozone
- Methane Gas Conserved/Reduced
 - ~850 million cubic feet per year
 - Enough to heat 10,500 homes
 - Global warming mitigation of 70,000 acres of trees

Settlements - Projects to Mitigate Past Harm

- Methane conservation/VOC reduction
 - Replace high-bleed with low/no-bleed pneumatics
 - Performance Optimization Review
 - Leak detection & repair w/ IR camera
 - Multi-phase gathering P/L
 - Low/zero emission dehydrators

Settlements - Other Projects

- Decrease Truck Traffic & Road Dust
 - Down-hole water separation
 - Road shale-plating
 - Class II UG injection well
 - Multi-phase gathering P/L
- Ambient air monitors – NO_x, ozone, PM_{2.5}

Settlements - Other Requirements

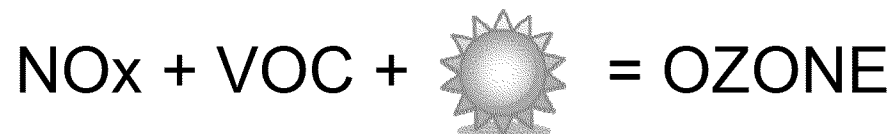
- Controls on new minor facilities
 - Catalysts on engines
 - Low emission dehydrators or combustors
 - Condensate tank controls
 - Low/no bleed pneumatics
 - Liquid bed sulfur removal

Air Regulations


Clean Air Act (CAA) Rules for O&G

Different rules for different pollutants

- Criteria Pollutants = SO₂, Pb, PM, CO, NO_x, Ozone(VOC)



- Hazardous Air Pollutants (HAPs)

1. PSD (Prevention of Significant Deterioration) for criteria pollutants
2. NSPS (New Source Performance Standards) for criteria pollutants
3. NESHAPS (National Emission Standards for HAPs)
4. Title V 

PSD for Criteria Pollutants

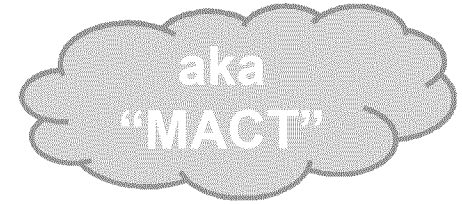
- If any criteria pollutant > 250 tons per year (TPY)
- BEFORE construction begins need permit
- Air monitoring and modeling to understand impact on air quality
- Have to significantly reduce emissions
- Have to demonstrate that control devices to reduce emissions are working

NSPS for Criteria Pollutants

- Subpart OOOO – new rules for NEW O&G facilities
 - Subpart KKK – fugitive VOC emissions at gas plants (1985)
 - Subpart LLL – SO₂ emissions from gas processing plants (1985)
 - Subpart IIII – NO_x and PM emissions from Compression Ignition Engines
 - Subpart JJJJ – O_x, CO, and VOC emissions from Spark Ignition Engines
 - Subpart GG/KKKK – NO_x and SO₂ emissions from Gas Turbines
-

- Self implementing
- Notify of construction commencement and start-up (dependent on subpart)
- Have to reduce emissions
- Have to demonstrate that emission reductions are working

NESHAPS for HAPs

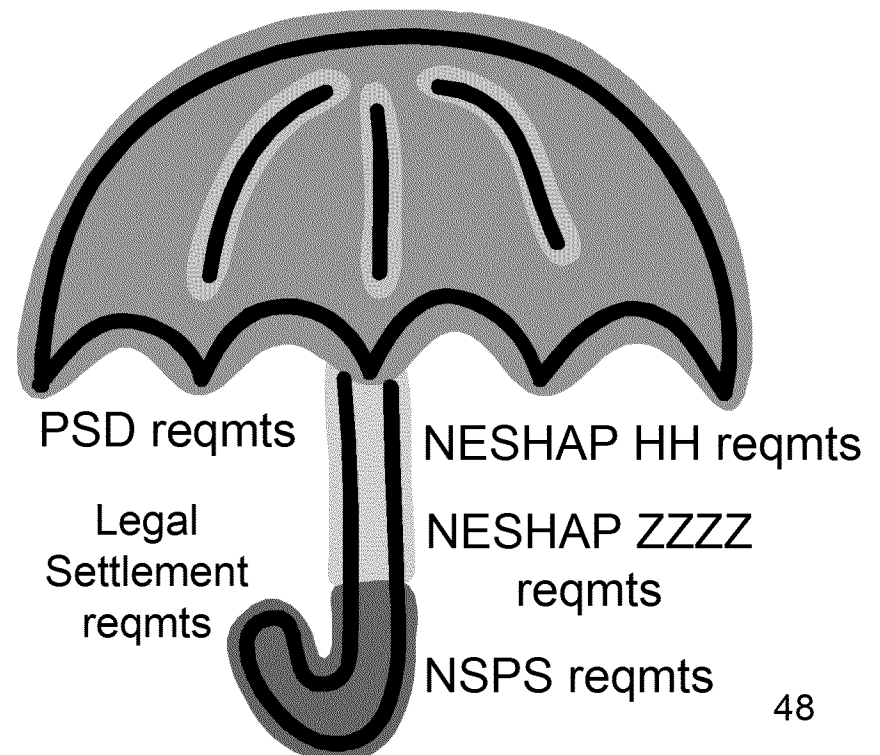


- Subpart HH & HHH – emissions from glycol dehydrators (leaks at gas plants)
 - Subpart ZZZZ – emissions from engines
-

- Self implementing
- If any single HAP > 10 TPY or combination of HAPs > 25 TPY, and Area Sources
- BEFORE construction begins notify EPA
- Have to significantly reduce emissions
- Have to demonstrate that control devices to reduce emissions are working

Title V/Part 70 & 71

- OPERATING permit with all requirements in one place
- If any criteria pollutant > 100 (TPY) ... or ... NESHAP applies
- Application submitted 1 year after start-up



O&G VOC/METHANE EMISSION SOURCES COVERED BY AIR REGULATIONS

Emission Source	GHGRR-W ¹	NESHAP HH/HHH	NSPS OOOO/KKK/LLL	Colorado REG.7	Wyoming CH.6, SEC.2 ²
Natural gas pneumatic device venting	✓		✓	✓	✓
Natural gas driven pneumatic pump venting	✓				✓
Acid gas removal vent stack	✓		✓		
Dehydrator vent stacks	✓	✓		✓	✓
Well venting for liquids unloading	✓			✓	✓
Gas well venting during well completions and workovers with hydraulic fracturing	✓		✓		✓
Gas well venting during well completions and workovers without hydraulic fracturing	✓				✓
Blowdown vent stacks	✓				
Onshore production storage tanks	✓		✓	✓	✓
Well testing venting and flaring	✓				
Associated gas venting and flaring (oil wells)	✓			✓	
Flare stacks	✓	✓	✓	✓	✓
Centrifugal compressor venting	✓		✓		
Reciprocating compressor rod packing venting	✓		✓		
Emissions from equipment leaks (gas plants)	✓	✓	✓	✓	
Emissions from equipment leaks (comp. stations)				✓	
Emissions from equipment leaks (wellsites)				✓	✓
Enhanced Oil Recovery hydrocarbon liquids dissolved CO ₂	✓				
Enhanced Oil Recovery injection pump blowdown	✓				
Oil well venting during well completions					
Water storage tanks			✓	✓	✓
Truck Loading					
Compressor Engines					
Drill Rigs/Workover Rigs					
Produced Water Ponds					

¹ Midstream "booster/gathering" compressor stations currently excluded

² Oil & gas production facilities Presumptive BACT (requirements depend on area of State/level of O&G development)

Federal Air Regulations

- Oil & Gas NSPS OOOO: 40 CFR Part 60, Subpart OOOO
 - Regulates criteria pollutants for oil and gas production segment and natural gas processing plants
 - Methane is NOT regulated, only co-benefit from VOC reductions
- Oil & Gas NESHAP HH/HHH: 40 CFR Part 63, Subpart HH
 - Regulates HAP emissions primarily from dehydration units (sometimes storage vessels and equipment leaks too)
- Ft. Berthold Federal Implementation Plan (FIP)
 - Applies only to oil production pads on Ft. Berthold Indian Reservation
- Engine Regulations (NSPS & NESHAP)
- Permitting - Minor NSR, PSD, NA NSR

NSPS OOOO

- NSPS OOOO
 - Well Completions - natural gas wells, not oil wells
 - Compressors
 - Pneumatic controllers
 - Storage Vessels
 - Equipment Leaks
 - Sweetening Units
- NESHAP HH (revised w/ OOOO on 8/16/12)
 - Dehydration units
 - Equipment leaks - must meet HAP concentration criteria
 - Storage Vessels - must meet throughput criteria

Cost Savings & Emissions Reductions

- Cost savings of **\$11 to \$19 million in 2015**, due to the value of natural gas and condensate that will be recovered and sold will offset costs.
- EPA estimates the following combined annual emission reductions upon full implemented:
 - **VOCs: 190,000-290,000 tons/yr**
 - **HAPs: 12,000-20,000 tons/yr**
 - **Methane: 1.0-1.7 million short tons/yr**
(about **19-33 million tons of CO₂ equivalent (CO₂e)**)

Ft. Berthold Federal Implementation Plan (FIP)

- Applies to oil production facilities on Ft. Berthold Indian Reservation
- Applies to wells completed after 8/12/2007
- Well Completions
 - Reduce VOC emissions by 90%
- Heater-treaters & storage tanks
 - 1st 90 days of production:
 - reduce VOC emissions by at least 90%
 - After 90 days:
 - recover and inject natural gas into gathering pipeline; or
 - reduce VOC emissions by at least 98%
- Annual emission reduction of 2,090 TPY VOC per well (~4.2 million TPY reservation-wide)

Engine Regulations

- NSPS JJJJ – Spark Ignition Engines
- NSPS IIII – Compression Ignition Engines
- MACT ZZZZ
- Many factors affect applicability
- NSPS applies to newer engines
- MACT applies to some existing source categories


Unregulated Emissions

- NSPS only applies to NEW sources - existing units not covered
- Equipment leak standards (LDAR) only for natural gas plants, not production or midstream sector
- Well completions standards in NSPS OOOO do not apply to oil wells
- Ft. Berthold FIP only applies to Reservation, no federal requirement for separators/heater treaters
- Truck loading operations
- Existing lean-burn engines > 500 hp at major source of HAPs
- Water evaporation ponds – produced and flowback water

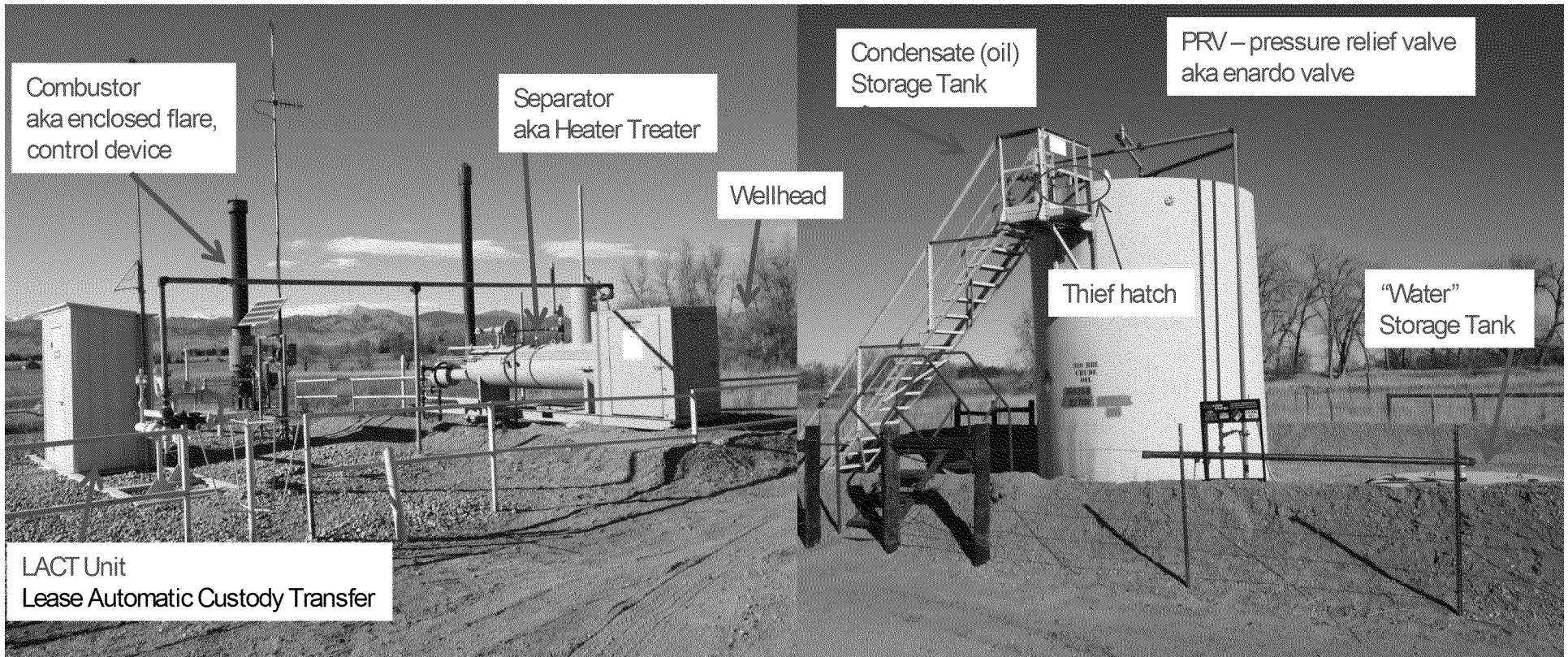
Inspections

Inspection Protocol

Set date/time in equipment

1. Note time of arrival at site & weather
2. Take GPS reading
3. Take wind speed/direction reading  If > 12-14 mph
4. Sketch plot plan (wellsite or an area of larger facility)
5. HSM scan of site (or area)
6. Equipment piece survey using R8 IR Survey Checklists
 - note IR Frame # and confirming PID reading (max)
 - end each video in conventional mode
7. HSM scan of site (or area) again
8. Note time of departure

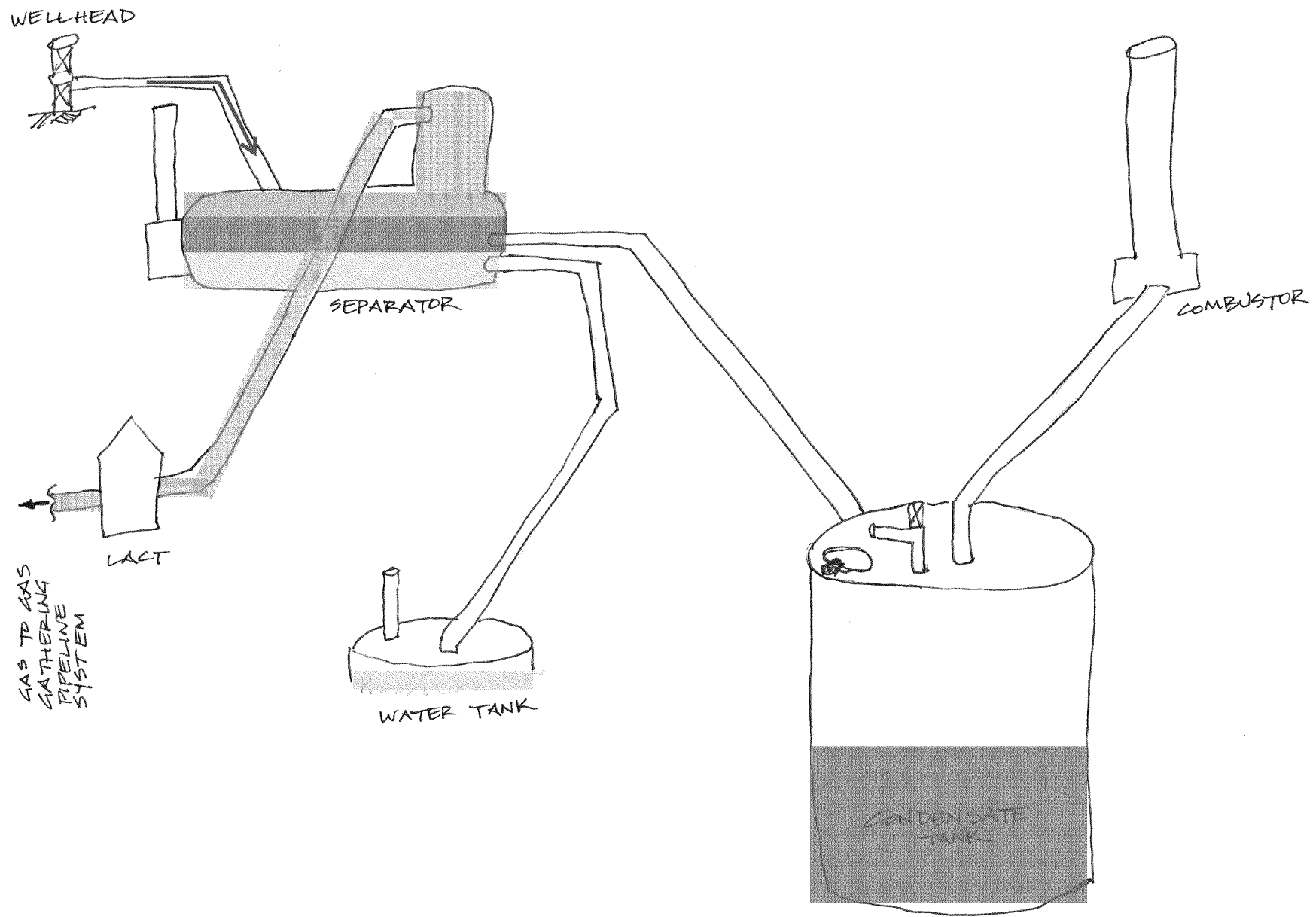
Wellsite Facility - Minimum

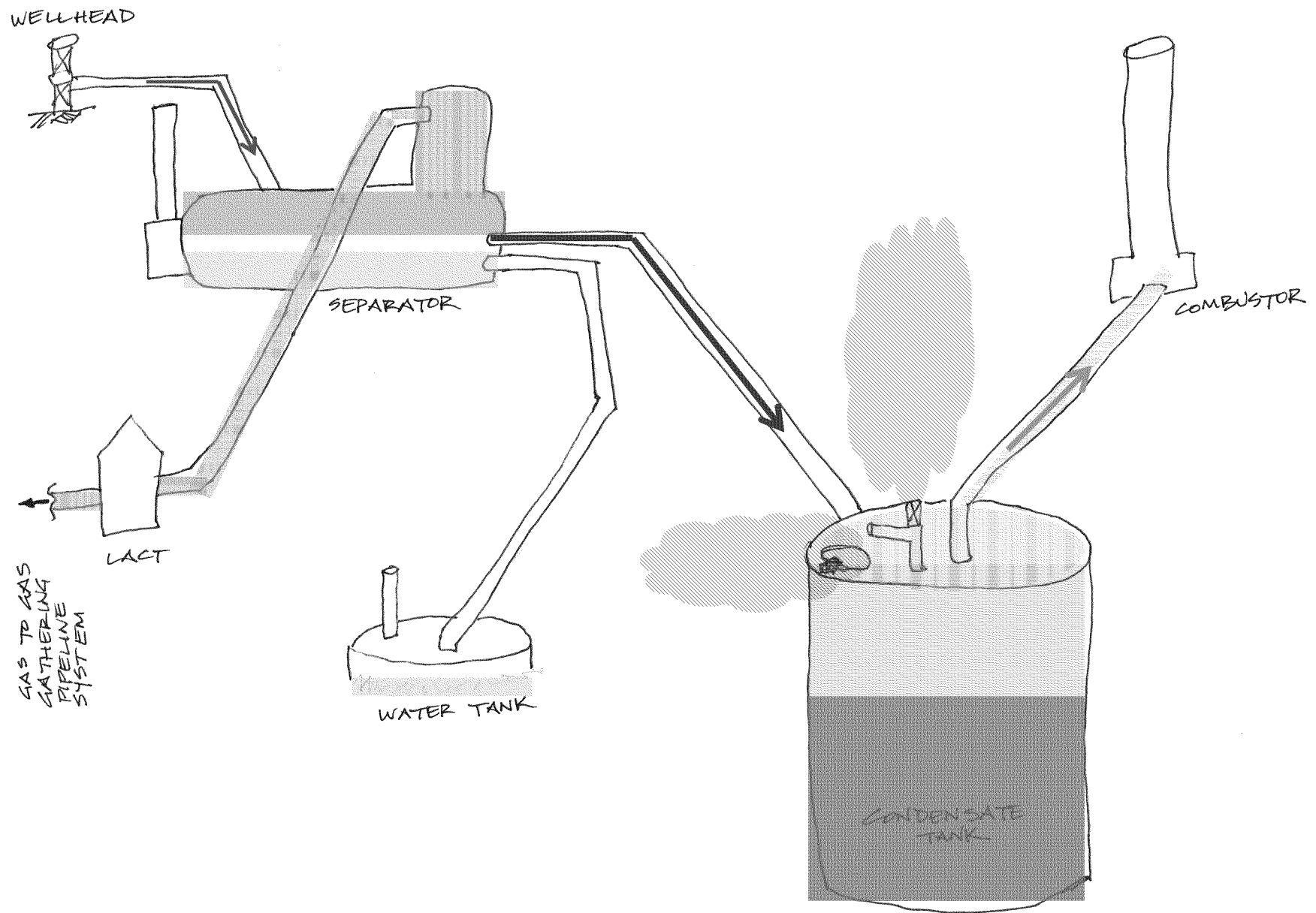


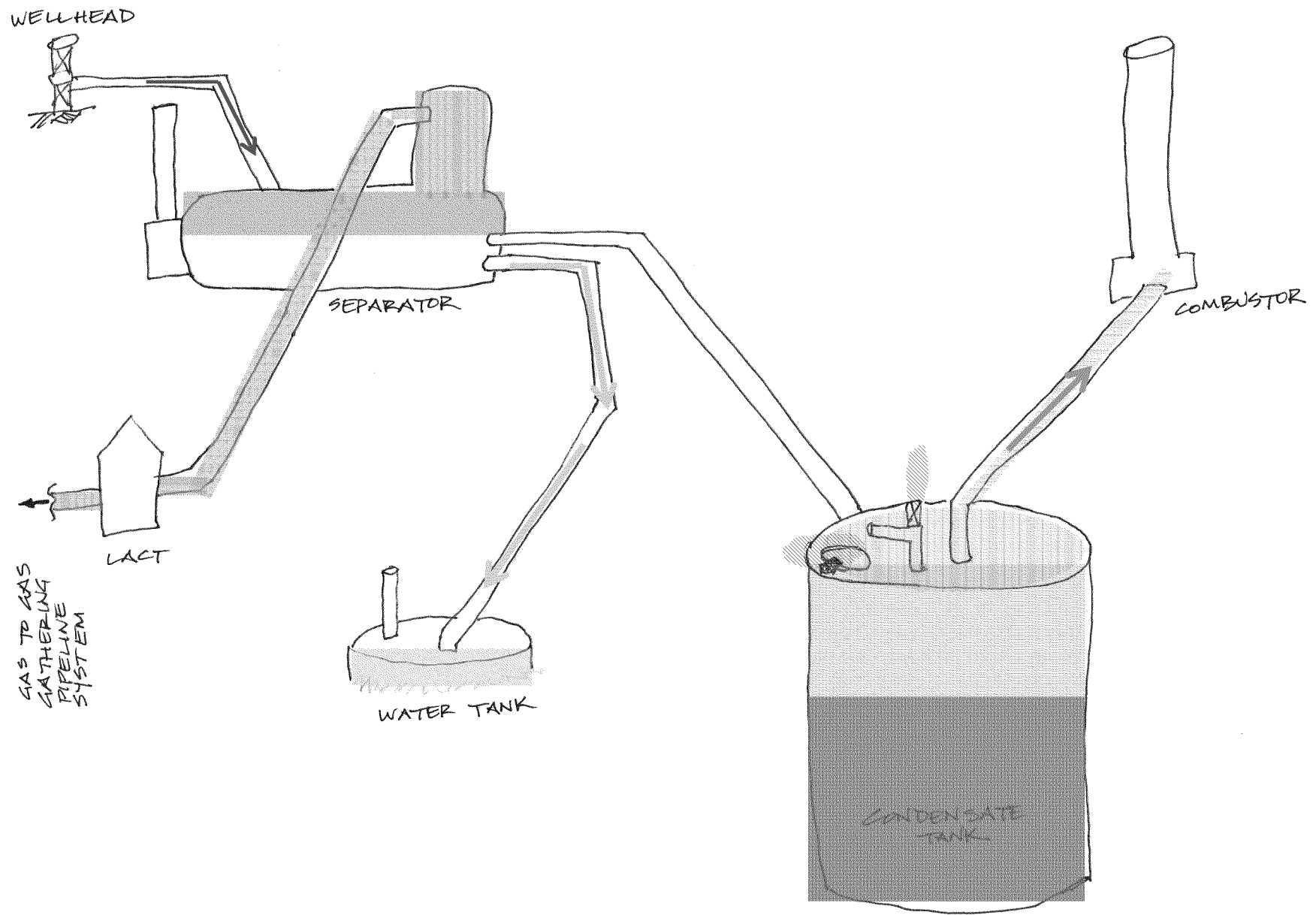
1 Site:

- 1 Well
- 1 Condensate Tank
- 1 closed vent system

Enforcement Confidential --
Deliberative --Attorney-Client
Privilege







EPA R8 WELLSITE/TANK BATTERY IR SURVEY INSPECTION

COMPANY:

FACILITY NAME:

DATE:

TIME ARRIVE:

TIME DEPART:

WIND SPEED (mph):

CLOUD COVER:

TEMPERATURE (°F):

Wellsite Example

SITE PLOT PLAN:

1. Take GPS reading at entrance to site
2. Sketch site plot plan with tank identifiers
3. Take photo of sign listing Well names and API Numbers
4. Use OGI to look at (and confirm IR recordings, which are safe to reach, with PID/TVA reading)
 - a. Condensate Storage Tanks
 - i. Venting from pressure relief devices, e.g. thief hatches, Enardo valves, etc.
 - ii. Note/photo signs of indications of previous over-pressure events
 - iii. Note if hissing, visible to eye, or odors observed
 - iv. Note if liquid dump event from separator/heater treater heard or not
 - b. Water storage tanks
 - i. Note/photo/sketch communication between condensate storage tanks and water tanks
 - c. Closed vent system (CVS) piping between tanks and control device including any liquid KO tanks along the way
 - d. Control device/enclosed flare/combustor
 - i. Look at any drip pots at base of combustor
 - ii. Note if pilot flame is visible through the sight glass
 - iii. Note if signs of internal thermal lining degradation or sooted up sight glass
 - iv. Note if visible smoke
 - v. Unburned hydrocarbon streams from top of combustor (move hot tip out of viewing screen) – note if soot at top of combustor
 - vi. Note if valves for pilot gas are OFF or ON and the pressure reading
 - vii. Confirm valves on vapor stream piping from tanks to combustor in ON position
 - e. Separators/Heater Treaters
 - i. Fugitive leaks
 - ii. Unburned hydrocarbon streams from heater stack - note if soot at top of stack
 - iii. Note pressure reading(s) on separator (if dual stage, two different pressures)
 - f. Tank heaters
 - i. Unburned hydrocarbon streams from heater stack - note if soot at top of stack

LEGEND:

X Thief hatch location on tank

O PRV location on tank

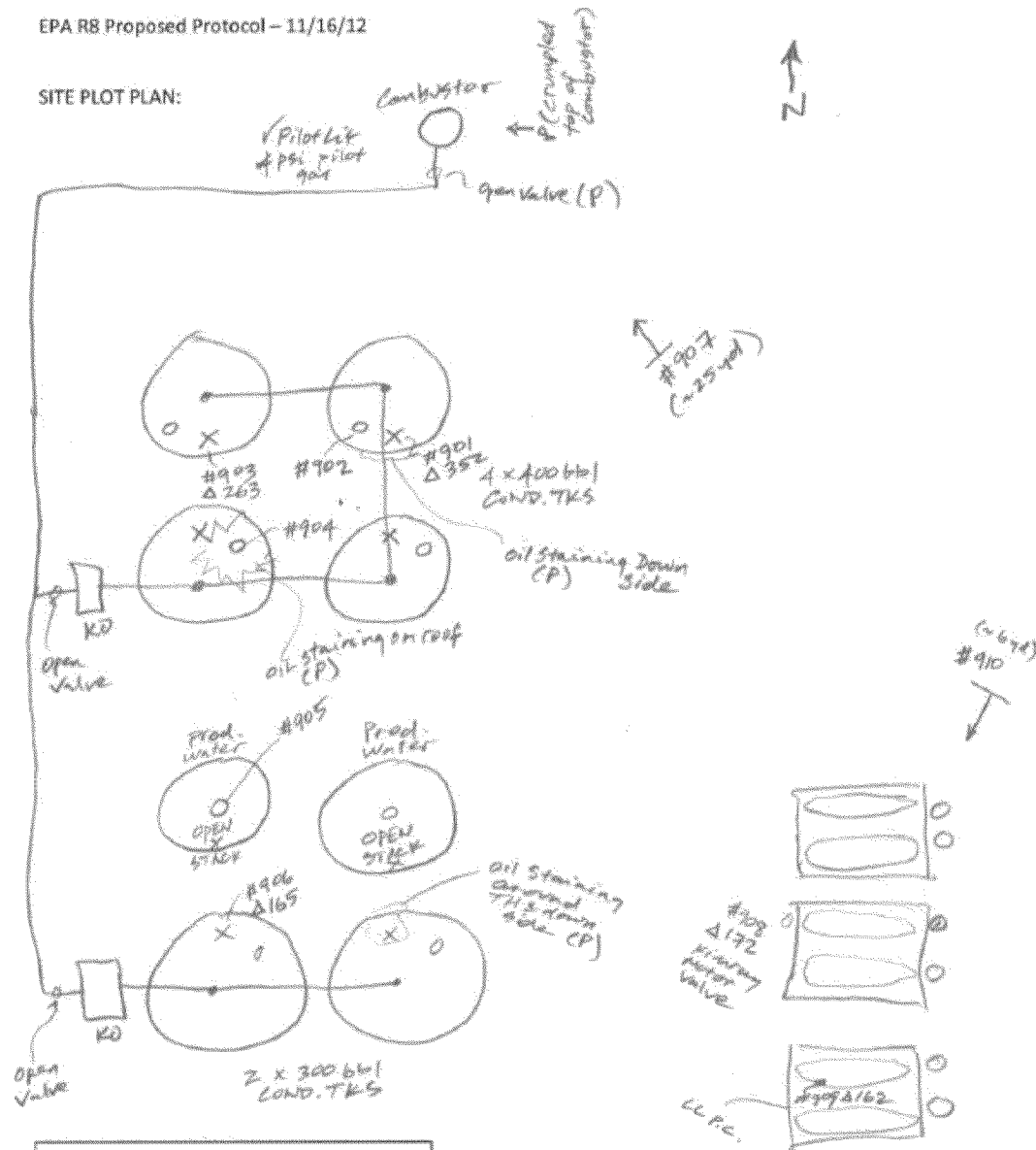
— Vapor collection piping (w/ tie-in point)

IR Video – Frame

Δ PID/TVA Reading (ppm)

P Photograph taken

SITE PLOT PLAN:



LEGEND:

- X Thief hatch location on tank
- o PRV location on tank
- Vapor collection piping (w/ tie-in point)
- # IR Video - Frame #
- Δ PID/TVA Reading (ppm)
- P Photograph taken

NO AIRS ID #S
ON SITE

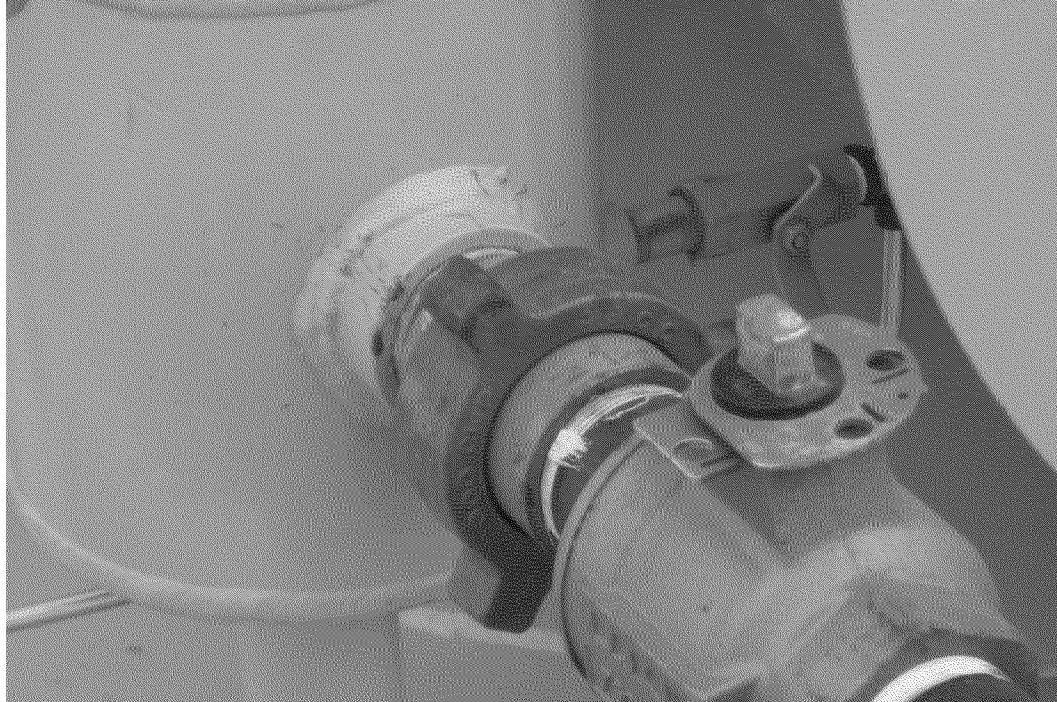
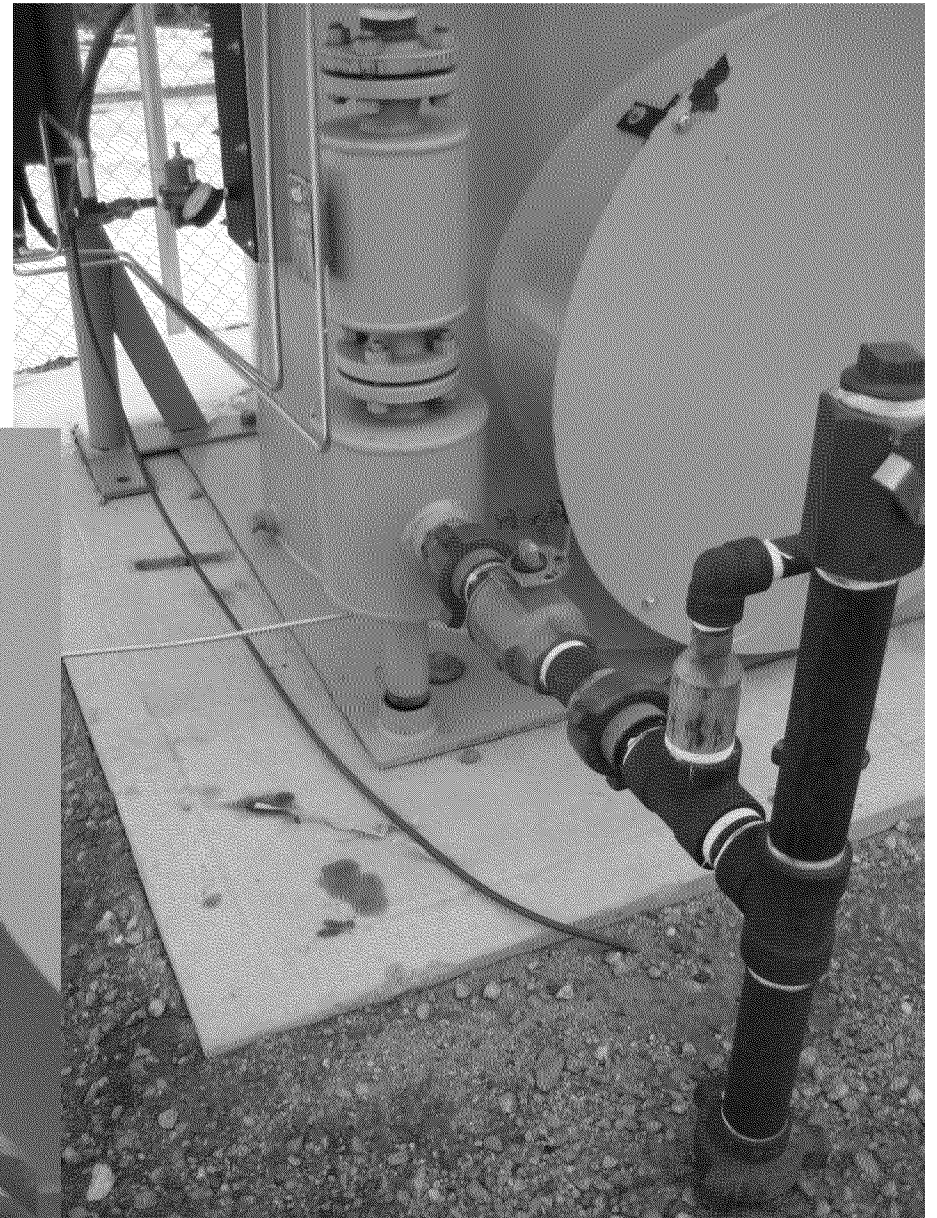
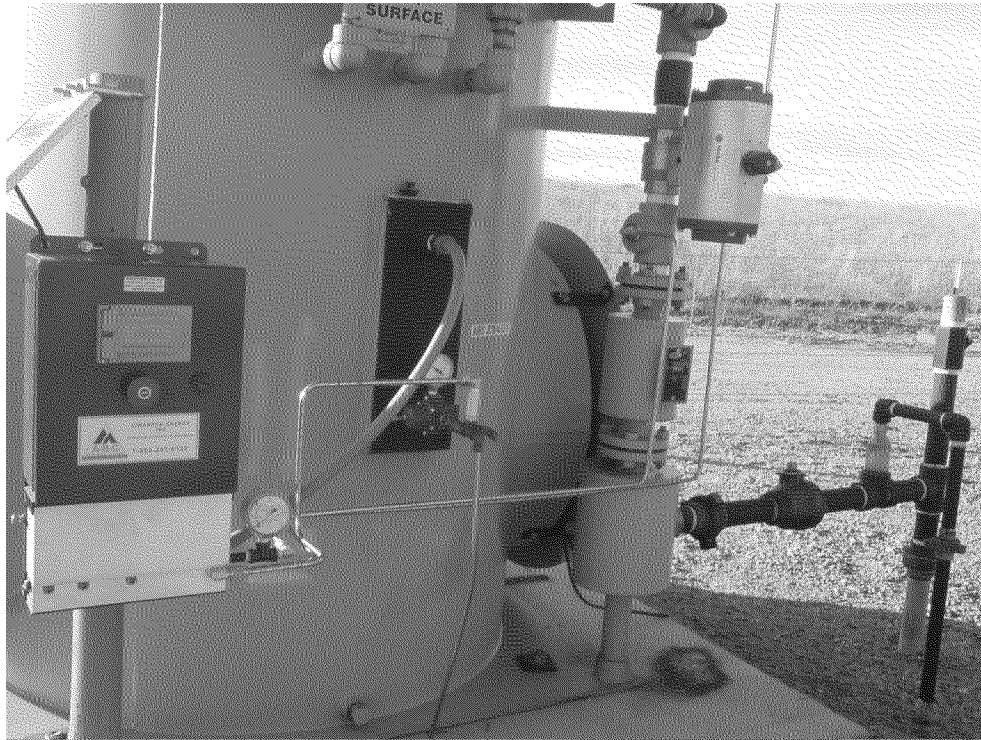
Oil staining indicative of over-pressure events

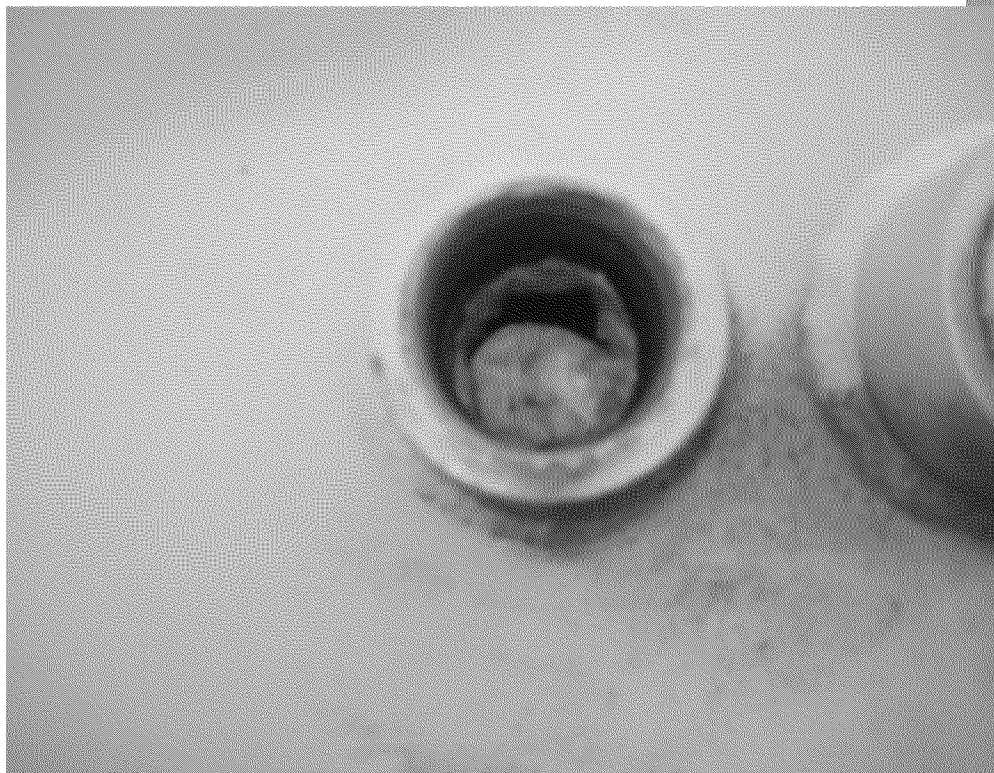


Oil staining indicative of over-pressure events









Estimating Emissions Using GRI-GLYCalc and API's E&P TANKS

open separate powerpoint

EPA Natural Gas STAR

EPA Natural Gas STAR



The Natural Gas STAR Program is *a flexible, voluntary partnership* between EPA and the oil and natural gas industry designed to *cost-effectively reduce methane emissions* from natural gas operations.

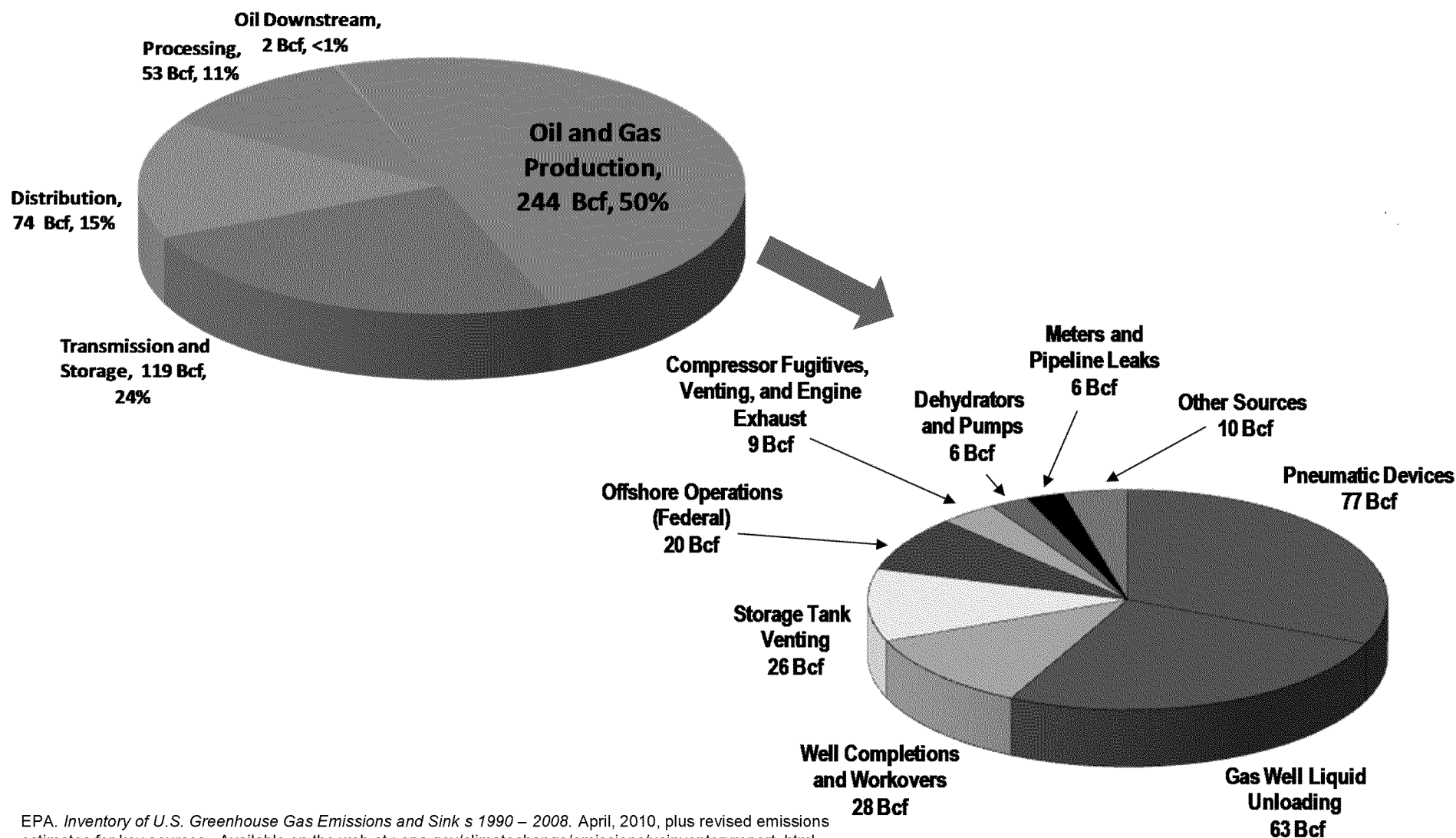
EPA Natural Gas STAR



- Over 129 Program Partners across all sectors
- Save time identifying the “right” technologies and practices to reduce methane emissions
 - 80+ Technical studies and fact sheets based on real company applications
 - Case studies and trade journal articles describing successful partner experiences, new technologies and savings potential
 - Economic analysis software to estimate financial returns

2008 U.S. Methane Emissions from O&G industry

- 491 Bcf (2.9% of total U.S. greenhouse gas emissions)
- Worth \$3.4 billion (at \$7/Mcf)



EPA. *Inventory of U.S. Greenhouse Gas Emissions and Sinks 1990 – 2008*. April, 2010, plus revised emissions estimates for key sources. Available on the web at : epa.gov/climatechange/emissions/usinventoryreport.html
 Natural Gas STAR reductions from gathering and boosting operations have been moved to the production sector.



Natural Gas STAR Program

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NaturalGas

EPA POLLUTION PREVENTER



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[Workshops/ Conferences](#)

[Natural Gas STAR International](#)

[Frequent Questions](#)

The Natural Gas STAR Program is a flexible, voluntary partnership that encourages oil and natural gas companies domestically and abroad—to adopt cost-effective technologies and practices that improve operational efficiency and reduce emissions of methane, a potent greenhouse gas and clean energy source.



Basic Information

[Program Overview](#) | [Overview Oil and Natural Gas Industry](#) | [Methane Emission Sources and Opportunities](#) | [Industry Links](#)



Accomplishments

[Emission Reduction Achievements](#) | [New Tools and Resources](#)



Partners

[International Partners](#) | [Domestic Partners](#) | [Endorsers](#)



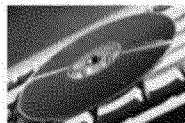
Join the Program

[Program Forms](#)



Guidelines to Participation

[Key Components of Natural Gas STAR](#) | [Annual Reporting](#) | [Beyond the Basics](#)



Documents, Tools & Resources

[Recommended Technologies and Practices](#) | [Program Forms](#) | [Service Provider Directory](#) | [Natural Gas STAR Videos](#) | [Online Reporting System](#)



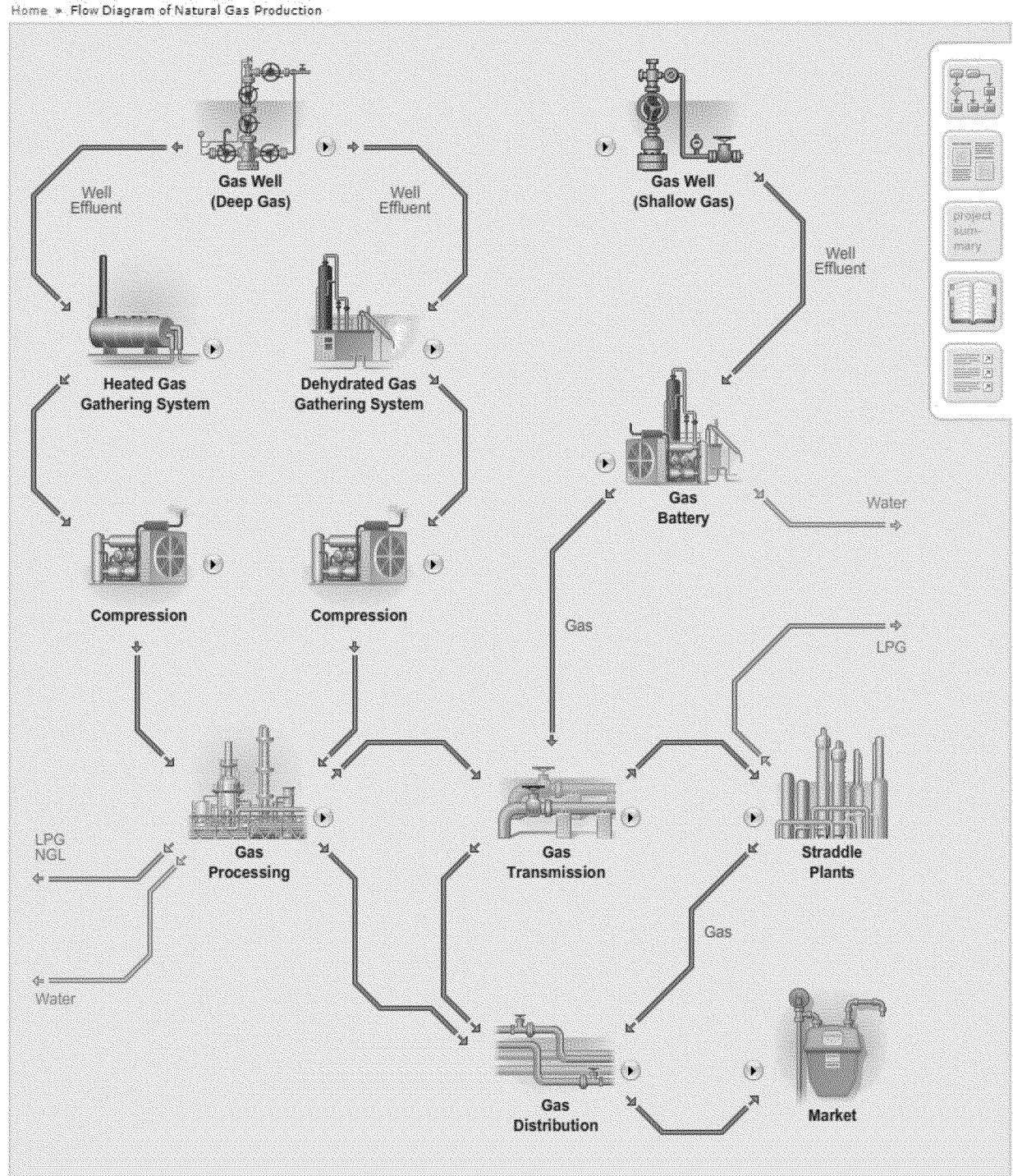
Newsroom

[Natural Gas STAR Partner Updates](#) | [News and Press Releases](#) | [Natural Gas STAR Award Winners](#)

www.epa.gov/gasstar/

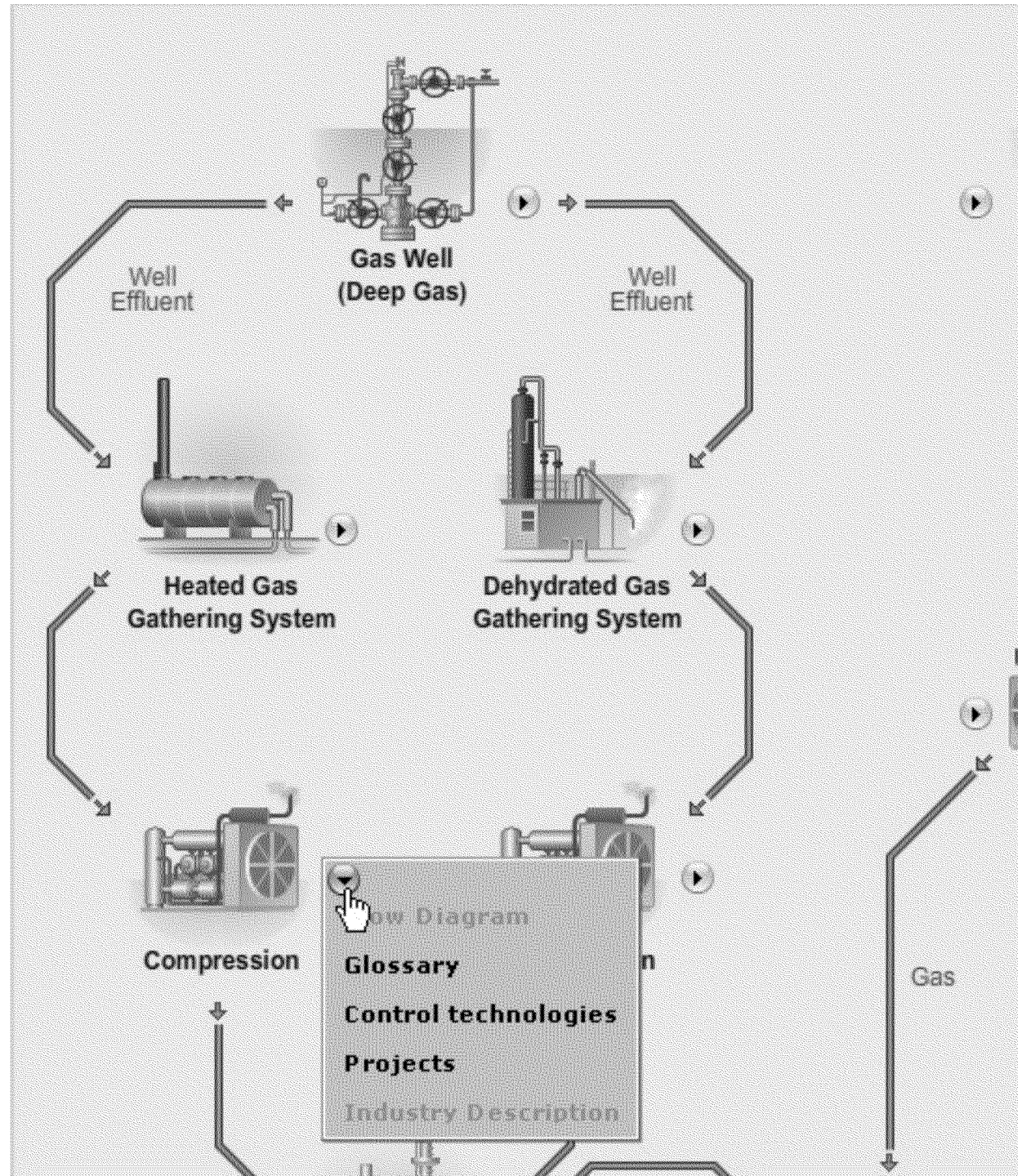
ON TIME Tool —

This Tool gives users easy access to information on cost-effective technologies and practices that reduce methane emissions in the oil and gas industry. Also displays interactive flow diagrams of the oil and gas industry.



Users can click within any part of the natural gas production schematic, by clicking on the adjacent arrow button.

For example, check out the Control Technologies to reduce emissions from compression of natural gas ...



Compression

Home » Control Technologies » Compressors » Add-on Controls: Compression

.... a list of field-tested operator experience in conserving gas and reducing emissions is provided

Automate Systems Operation to Reduce Venting

[Download PDF](#) 

Automated Air/Fuel Ratio Controls

[Download PDF](#) 

Install Electric Compressors

[Download PDF](#) 

Install Electric Starters

[Download PDF](#) 

Lower Purge Pressure for Shutdown Controls

[Download PDF](#) 

Methane Losses from Compressors

[Download PDF](#) 

Redesign Blowdown Systems and Alter ESD Practices

[Download PDF](#) 

Redesign Blowdown Systems and Alter ESD Practices

[Download PDF](#) 

Reduce the Frequency of Engine Starts with Gas

[Download PDF](#) 

Reducing Emissions When Taking Compressors Off-Line

[Download PPT](#) 

Reducing Emissions When Taking Compressors Off-Line

[Download PDF](#) 

Replace Gas Starters with Air

[Download PDF](#) 

Replace Ignition - Reduce False Starts

[Download PDF](#) 

Replacing Wet Seals with Dry Seals in Centrifugal Compressors

[Download PDF](#) 

Replacing Wet Seals with Dry Seals in Centrifugal

[Download PDF](#) 

Plunger Lifts with Smart Well Automation

PROBLEM:

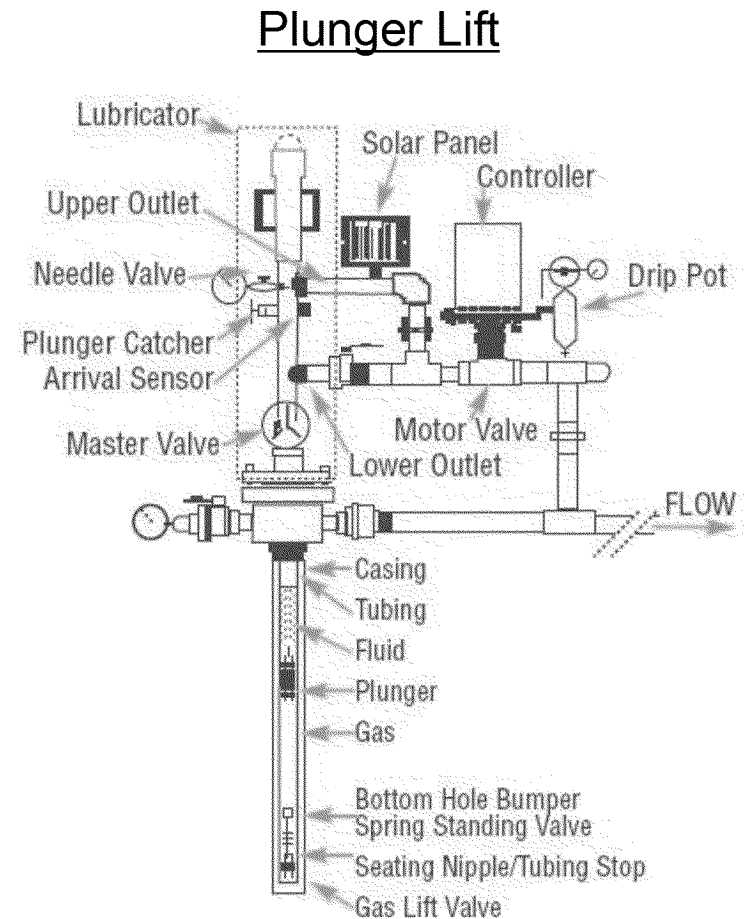
- Build-up of liquids in the well bore can reduce or halt production. Liquids unloaded by venting well to the atmosphere.

SOLUTION:

- Automated plunger lift relies on the natural buildup of pressure in a gas well to remove accumulated liquids with minimal venting

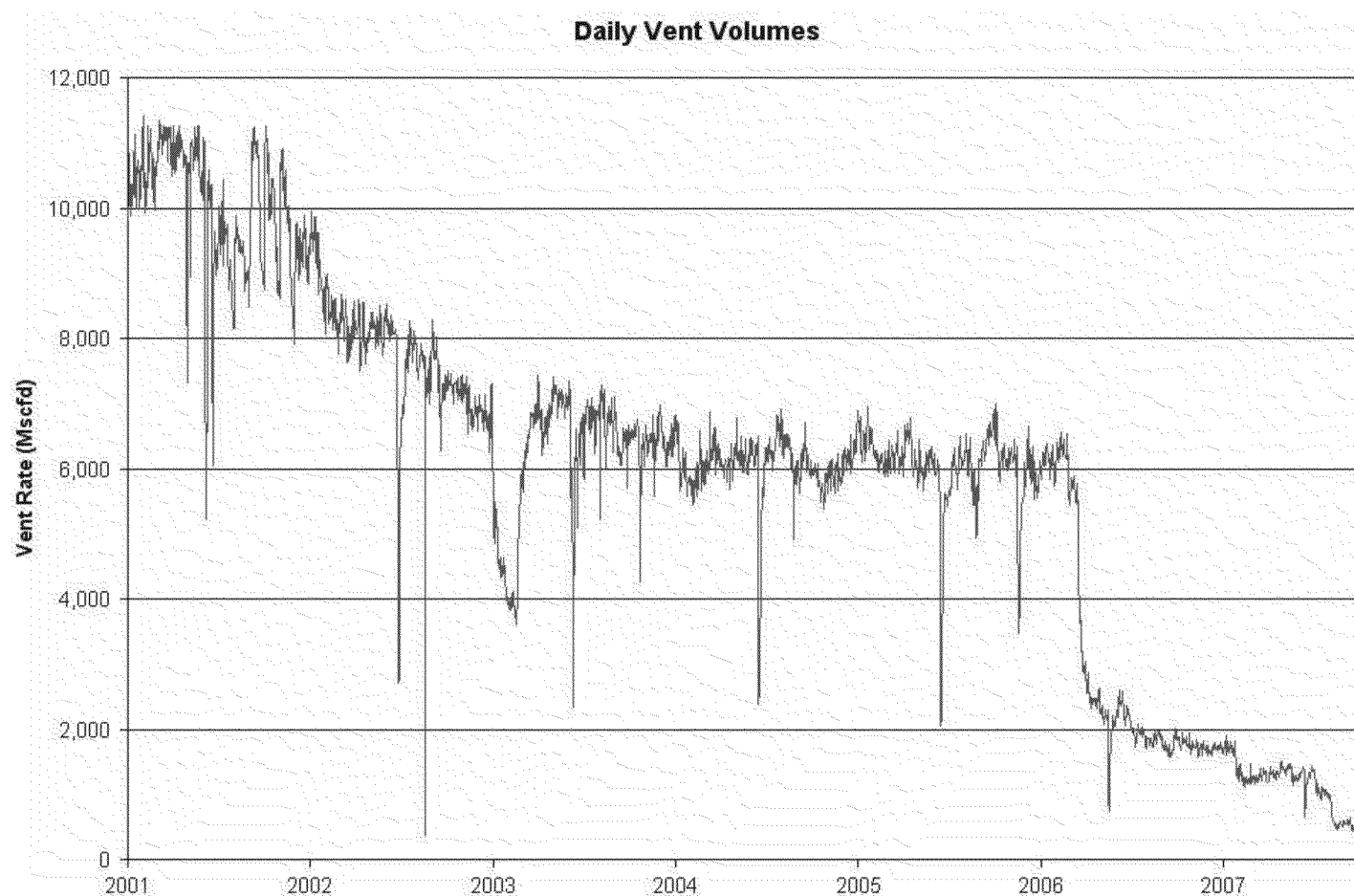
ADVANTAGES:

- Optimized plunger cycles can increase well production by 10 to 20%
- Reduced need for well venting, further increasing well production by 1 to 2%
- Manpower requirements reduced by half
- **\$17,500 savings in first year on average**
- 5 month simple payback



Field Experience: BP San Juan Basin

- Plunger optimization installed on ~2,200 wells
- Venting reduced by 50% from 2000 to 2004



Reduced Emissions Completions (RECs)

PROBLEM:

- It is necessary to clean out the well bore and formation after fracturing an unconventional well
- Operators produce flow back the well fluids, sand, and cuttings for disposal, venting/flaring gas in the process

SOLUTION:

- Portable equipment designed for this initial high flow rate separates sand and fluids to recover gas/condensate for sales

ADVANTAGES:

- 💧 Partners report recovering 2% to 89% of total gas vented during well completions and workovers
- 💧 Recovered product ranges from 7,000 to 12,500 Mcf gas and 1 to 580 barrels condensate
- 💧 **Provides \$50,000 to \$85,000 in savings**



Portable REC Equipment

Source: Weatherford

Reducing Emissions from Pneumatic Devices

PROBLEM:

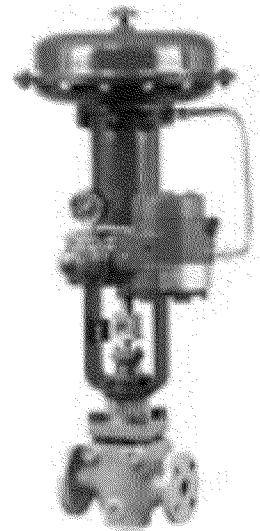
- As part of normal operations, pneumatic devices release natural gas to atmosphere for valve actuation and process control
- High-bleed devices bleed in excess of 6 scf/hour
 - Equates to >50 Mcf/year
 - Typical high-bleed pneumatic devices bleed an average of 140 Mcf/year

SOLUTION:

- Process control and valve actuation can often be accomplished with low bleed devices which vent less than 6 scf/hour

ADVANTAGES:

- Payback periods ranging from <1 month to 14 months
- Chesapeake Energy retrofitted 2,670 devices and reported simple payback of 7 months (using \$3.50/Mcf)



Fisher Electro-Pneumatic Transducer

Source: www.emersonprocess.com

Reciprocating Compressor Emissions Reduction

PROBLEM:

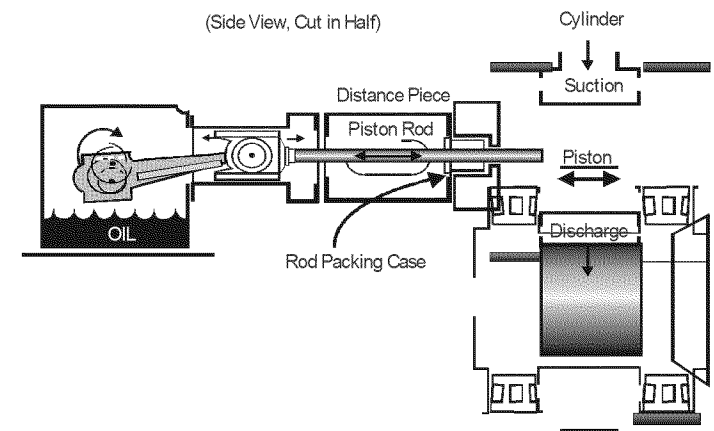
- Reciprocating compressor rod packing leaks some gas by design which increases significantly as the packing wears
 - New, properly installed packing may leak 11 to 12 scf/hour by design
 - Worn packing has been reported to leak up to 900 scf/hour

SOLUTION:

- 💧 Replace worn packing at the economic threshold where value of avoid emissions justifies packing replacement

ADVANTAGES:

- 💧 Payback period of as low as 6 months
- 💧 One Partner monitored and reduced emissions at two compressors
 - 💧 Unit A emissions reduced from 301 liters/min (640 cf/hour)
 - 💧 Unit B emissions reduced from 105 liters/min (220 cf/hour)



GHG Reporting Rule – Subpart W

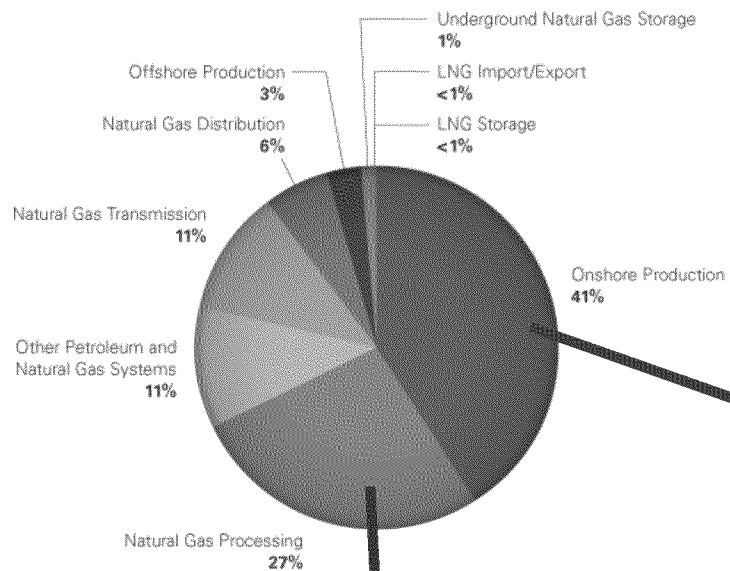
GHG Reporting Rule – Subpart W

- EPA issued 40 CFR Part 98, which requires reporting of greenhouse gas (GHG) emissions from large sources and suppliers in the US
- Data reported will provide a better understanding of where GHGs are coming from and will guide development of sound policies and programs to reduce emissions.
- Subpart W = Petroleum and Natural Gas Systems
 - Fugitive & vented emissions are fifth largest source category GHG rule
 - Onshore O&G report by Basin
 - Data Reported for 2011 and 2012 (submit by 3/31 each year)
- Combustion emissions reported under Subpart C = General Stationary Fuel Combustion

See: <http://www.epa.gov/ghgreporting/reporters/subpart/w.html>

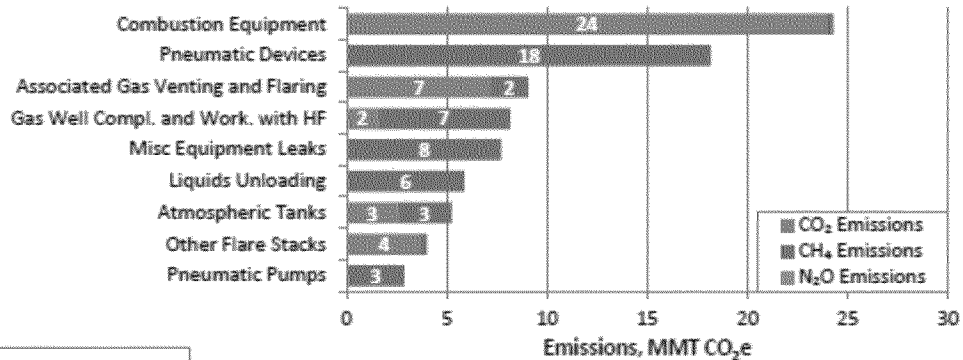


2012 TOTAL REPORTED DIRECT EMISSIONS FROM PETROLEUM & NATURAL GAS SYSTEMS, BY SUBSECTOR (AS OF 9/1/13)

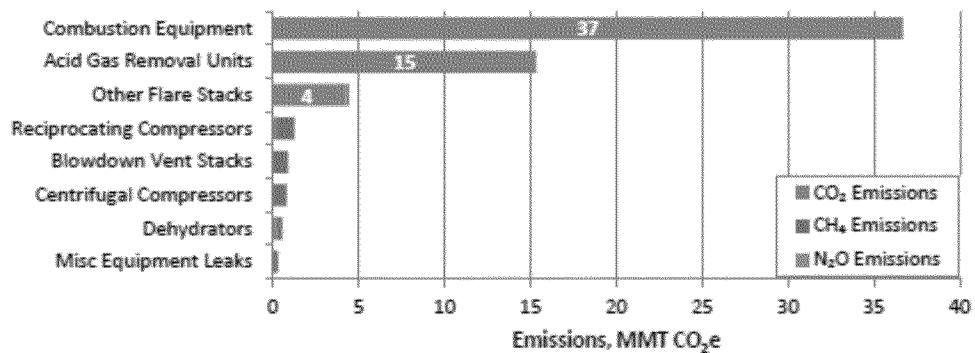


Greenhouse Gas Reporting Program Subpart W

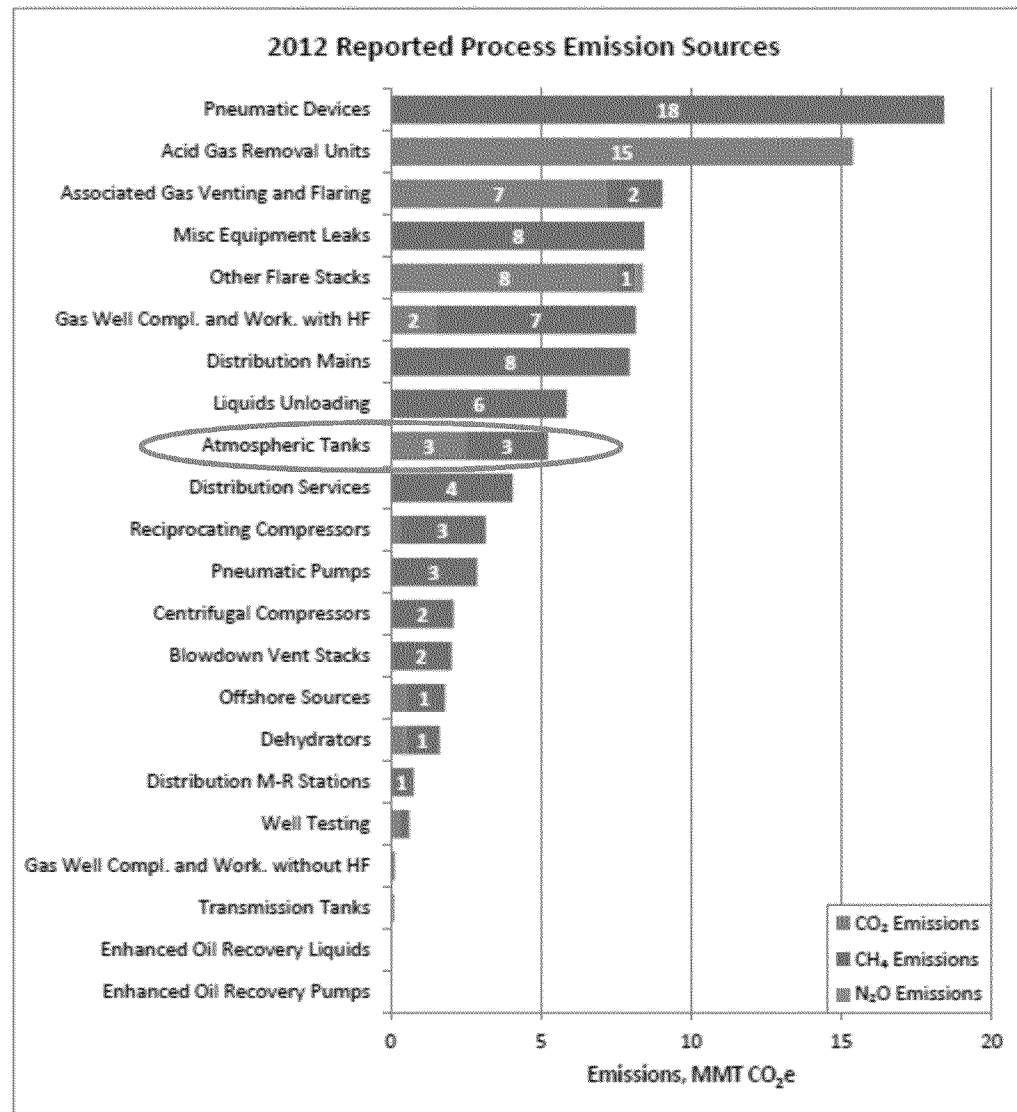
2012 Onshore Production: Top Reported Emission Sources



2012 Natural Gas Processing: Top Reported Emission Sources

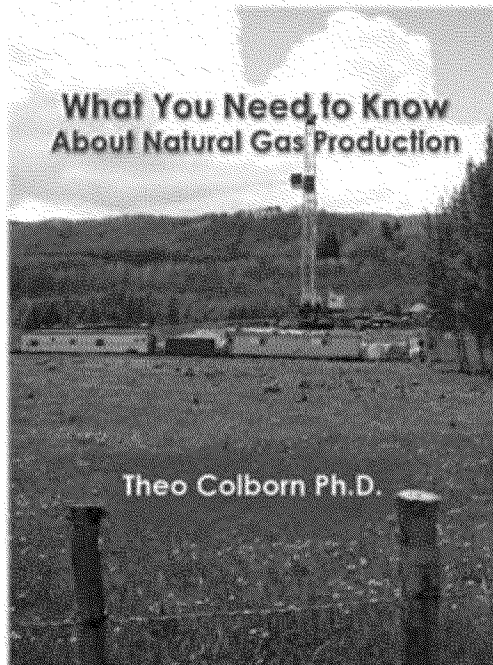


Greenhouse Gas Reporting Program Subpart W



Information Sources

Other Sources of Information



TEDX - The Endocrine Disruption Exchange

Go to this web site to order a copy of the DVD:

<http://www.endocrinedisruption.org/chemicals.video.php>

EPA Natural Gas STAR Program

www.epa.gov/gasstar/



STATE O&G DATA:

Utah:



Utah Oil and Gas

Division of Oil, Gas and Mining - Department of Natural Resources

http://oilgas.ogm.utah.gov/Data_Center/LiveData_Search/main_menu.htm

Electronic Code of Federal Regulations

<http://ecfr.gpoaccess.gov/> ... Title 40

Electronic Code of Federal Regulations

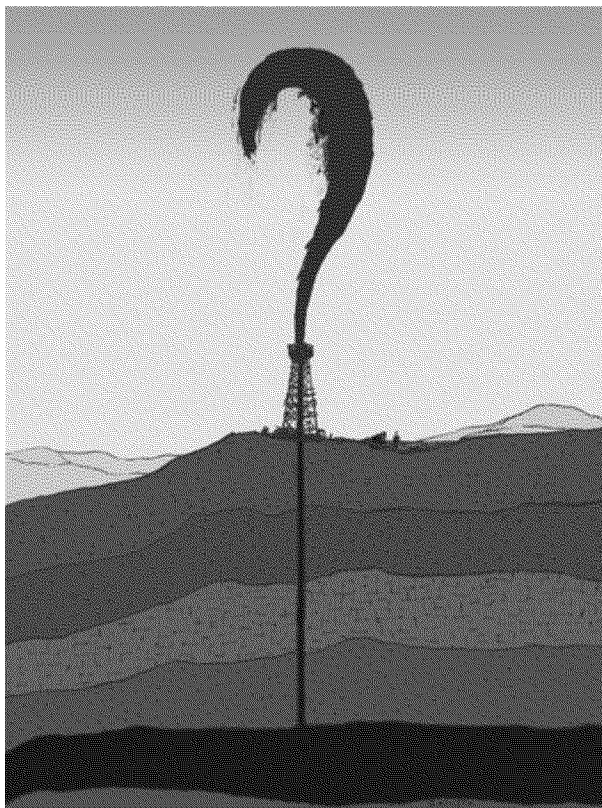
e-CFR
TM

EPA Technology Transfer Network Air Toxics Web Site

<http://www.epa.gov/ttn/atw/eparules.html>



Questions



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Environmental Engineer

US EPA – Region 8

Office of Enforcement, Compliance & Environmental Justice